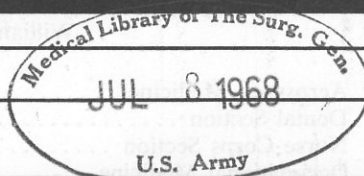


# UNITED STATES NAVY *Medical News Letter*

Vol. 51

Friday, 7 June 1968



No. 11



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*Policy*

The U.S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, sus-

ceptible to use by any officer as a substitute for any item or article, in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

*Change of Address*

Please forward changes of address for the News Letter to Editor: Bureau of Medicine and Surgery, Department of the Navy, Washington, D.C. 20390 (Code 18), giving full name, rank, corps, old and new addresses, and zip code.

**FRONT COVER: NAVAL RADIOLOGICAL DEFENSE LABORATORY.** The Biological and Medical Sciences Division of this Laboratory in San Francisco has been operating since 1946, its mission being to develop medical radiological defense. In fulfillment of this mission there have been studies on the biological effects of radioactive materials, the immunological aspects of radiation injury and recovery, delayed and late effects of radiation, military aspects of radiation hazards, and the effects of radiation on the nervous system; as well as studies on the hazards of airborne radioactive materials, the effects of irradiation on defenses against infection, and recovery from radiation at the organ system level. One recent study concerns the Gamma-ray energy shielding factor on ships. They provide a significant amount of shielding to their crews against ionizing nuclear radiation, the shielding's effectiveness varying widely from one part of a ship to another. NRDL has devised a simple method of calculation in graphical form which makes it easy to predict the protection offered by a specific location on the ship. Research is also underway on the effect of dose/limb shielding, chromosome studies of irradiated mice forming the basis for this work. In addition, mathematical models have been developed for analysis of the exposure of man's skin, lungs and gastrointestinal tract to radioactive debris which emanates from nuclear-powered aerospace vehicles as the result of their reentry burnup or self-destruction. By attempting new, careful and versatile mathematical formulations of radioactive processes, new insights into these processes may be gained, and simpler methods for treating the increased variety and complexity of radiation injury may be discovered. The Naval Radiological Defense Laboratory's research program has improved and extended our nation's defenses against the diverse effects of radiation.

The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

## ALCOHOL AND ALCOHOLISM

*Extracted from Alcohol and Alcoholism, Public Health Service Publication No. 1640, for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402—Price 50 cents.*

### History

The use and misuse of alcoholic beverages is a major subject of controversy in America. It has nearly always been so.

Efforts to control drinking have ranged from sermons from the pulpit and advice from physicians to judgments by the courts. The very political climate of the Nation has been shaped by attitudes about drinking—attitudes as disparate as those which brought about the Whiskey Rebellion of 1794 and the Volstead Act of 1919.

America has tried nationwide prohibition by Federal Law and rejected it. Today, it is generally accepted that those adults who wish to drink have a right to do so, limited by local customs defined by either written or unwritten laws. But legal rights, written or unwritten, are not the only factors involved. Social rights and social pressures are also concerned, and these may vary widely in different groups and different regions.

Under these circumstances, there is no one national attitude toward moderate or social drinking that is acceptable to everyone. Perhaps there will never be such agreement. But there is developing a common attitude concerning the excessive drinker, the problem drinker, and the alcoholic. This is based in part on the growing awareness that the problem of excessive drinking in this country is of serious proportions. It is based also on the growing recognition that alcoholism and excessive drinking represent not simply moral issues but medical problems with complicated and interrelated chemical, physiological, psychological, and sociological aspects. As such serious and complex problems, they require careful examination.

### Why People Drink

It is generally accepted today that alcohol, by strict definition, is a food, since it is a source of

calories. Like some other nutrients, it is not a perfect food; it contains no vitamins and is harmful when used to excess.

### Excessive Drinking

Throughout the history of alcoholic beverages, drunkenness has been considered a problem (although there have been times when it was accepted and even highly approved).

But while it has become clear that many and perhaps most Americans would continue to insist on their right to drink, it has also become evident that many Americans are drinking to excess, and endangering the lives and the welfare of themselves, their families, and all those around them. The problem of alcoholism, in fact, is now recognized as a serious public health problem that urgently demands intelligent, practical action based on better knowledge of its causes and potential cures.

### Nature of the Problem

The overwhelming majority of drinkers in the United States—an estimated 90 percent of them—have apparently learned to consume alcoholic beverages without significant hazard to themselves, their families or society. Yet the problems caused by the relatively few who have chosen neither abstinence nor moderation, but have become excessive or problem drinkers, affect the entire American society. Although the ratio of problem drinkers to the total population is relatively small, their numbers are large. The misery they cause themselves and others is enormous.

### The "Drinking Problem"

Sociologists have emphasized that a major part of the drinking problem is deciding who is and who is not a "problem drinker," for the label is applied differently in various cultural and social groups.



## The Problem Drinkers

Realistically, the problem drinkers are those who—by all standards—cause significant damage to themselves, their families or their communities because of drinking.

Some are clearly addictive drinkers or alcoholics. In addition, the list of excessive or problem drinkers must include those who are apparently not addicted to alcohol, who show no symptoms of dependency, but whose drinking has nonetheless created serious personal or family problems.

Among excessive drinkers of various types and degrees, most interest has centered on the addictive drinker—the alcoholic. It is frequently thought that alcoholics can be specially defined, diagnosed and counted. Unfortunately, the situation is not that simple.

## Alcoholics

### Definition

There is at present no formal definition of alcoholism or of an alcoholic which is universally or even widely accepted. Perhaps the one most widely considered as authoritative is that by Mark Keller of the Center of Alcohol Studies at Rutgers University, which follows closely that of the World Health Organization.

“Alcoholism is a chronic disease, or disorder of behavior, characterized by the repeated drinking of alcoholic beverages to an extent that exceeds customary dietary use or ordinary compliance with the social drinking customs of the community, and which interferes with the drinker’s health, interpersonal relations or economic functioning.”

Another important concept, described by Dr. Ebbe Curtis Hoff of the Medical College of Virginia, is based on three facets: (1) There is loss of control of alcohol intake—the victim finds himself drinking when he intends not to drink, or drinking more than he has planned. (2) There is functional or structural damage—physiological, psychological, domestic, economic or social. (3) Alcohol is used as a kind of universal therapy, as a psychopharmacological substance through which the problem drinker attempts to keep his life from disintegrating.

Modern concepts of alcoholism no longer attempt to set rigid boundaries between the moderate drinker and the alcoholic. Most professionals concerned now agree that there is no exact point applicable to everyone, below which one can accurately state: “This man is not an alcoholic and can continue to drink safely,” nor above which one can state: “This

man is now an alcoholic and can never control his drinking.”

## Consumption by Alcoholics

### The “Safe-Level” Myth

In the United States and Europe, attempts have been made to establish a “safe level” of drinking—the amount of distilled spirits, wine or beer that can be consumed daily without danger. In France, such attempts have led to the widely publicized admonition of “no more than a liter of wine per day.” But researchers have found that many alcoholics consume on the average less than the equivalent of a liter of wine a day, while some social drinkers consume more.

Experts have concluded that *how much* one drinks may be far less important than *when* he drinks, *how* he drinks and *why* he drinks.

### Scope of the Problem

#### Traffic Accidents

The National Safety Council has reported that traffic accidents in 1965 took 49,000 lives, caused 1,800,000 disabling injuries and cost about \$8.9 billion in property damage, wage losses, medical expenses and overhead costs of insurance.

Alcohol has unquestionably played a role in this tragic toll. Here the problem concerns not only alcoholics but also non-addicted individuals who have had too much to drink.

The Public Health Service’s Injury Control Program estimates that alcohol contributes to or is associated with 50 percent of fatal motor vehicle accidents.

Additional costs—impossible to determine accurately—may include friction with co-workers, lowered morale, bad executive decisions, and deteriorated customer and public relations. Unquestionably excessive drinking results in the loss of trained and experienced employees. This last factor can be especially damaging to a company, since alcoholic employees are usually in their middle years with many years of service. Such experienced workers are among the most valuable assets of any firm.

### Effects of Alcoholic Beverages on the Body

#### Effects on Skilled Performance

It has not been clearly established whether there is a threshold below which alcohol has no detectable influence on reflex responses, reaction time and



various complex skills. When the blood level reaches 0.03 or 0.04 percent, it is generally agreed that changes are evident.

At very low blood-alcohol levels, such simple reflex responses as the knee-jerk seem to be more rapid. At levels above 0.03 or 0.04, reflex responses, reaction-time responses and performances in such activities as automobile driving and many kinds of athletics generally change for the worse. Significantly, as a driver's performance is impaired, his judgment often deteriorates, and he believes he is driving better. A British investigator has found that for motorists the added risk is small and probably not significant up to about 0.05. Above that level, the risk rises sharply.

### The Hangover

The hangover is a common, unpleasant but rarely dangerous after-effect of overindulgence occurring in the moderate drinker who occasionally takes too much, as well as in the excessive drinker after a prolonged drinking bout. The exact mechanism is unknown. The symptoms are usually most severe many hours after the peak of the drinking bout, when little or no alcohol can be detected in the body. Although hangover has been blamed on mixing drinks, it can be produced by any alcoholic beverage alone, or by pure alcohol. There is inadequate evidence to support beliefs that it is caused by vitamin deficiencies, dehydration, fusel oils or any other non-alcoholic components.

No satisfactory specific treatment for hangover is known, and there is no scientific evidence to support such popular remedies as coffee, raw egg, oysters, chili peppers, steak sauce, "alkalizers," vitamin preparations, or such drugs as barbiturates, thyroid, amphetamine or insulin. For general treatment, physicians usually prescribe aspirin, bed rest, and ingestion of solid foods as soon as possible.

### Causes of Alcoholism

Over the past decades many different factors have been suggested as the cause of alcoholism. None has yet been accepted as the single causative agent.

#### Physiological Factors

Even though research to date has not indicated any chemical physiological or genetic factor as a cause of alcoholism, the possibility that such a physical factor exists cannot be ruled out, and further investigations are essential.

#### Psychological Factors

If there is an actual "alcoholic personality"—or a "pre-alcoholic personality"—its specifications are poorly defined and often contradictory, and seem to apply broadly to all mental illness. Knowledge of the role played by psychological factors in alcoholism also awaits further research.

#### Sociological Factors

Although intensive research has so far failed to identify a simple chemical, physiological or emotional cause of alcoholism, studies in a different area are now yielding new findings regarded by many scientists as particularly illuminating and potentially practical. Largely in the field of sociology, but also involving physiology, psychology, nutrition, cultural anthropology and epidemiology, these new studies have been aimed at determining why alcoholism is widespread in some national and cultural groups but rare in others.

In general, research has shown that for groups that use alcohol to a significant degree, the lowest incidence of alcoholism is associated with certain habits and attitudes:

1. The children are exposed to alcohol early in life, within a strong family or religious group. Whatever the beverage, it is served in very diluted form and in small quantities, with consequent low blood-alcohol levels.
2. The beverages commonly although not invariably used by the groups are those containing relatively large amounts of non-alcoholic components, which also give low blood-alcohol levels.
3. The beverage is considered mainly as a food and usually consumed with meals, again with consequent low blood-alcohol levels.
4. Parents present a constant example of moderate drinking.
5. No moral importance is attached to drinking. It is considered neither a virtue nor a sin.
6. Drinking is not viewed as a proof of adulthood or virility.
7. Abstinence is socially acceptable. It is no more rude or ungracious to decline a drink than to decline a piece of bread.
8. Excessive drinking or intoxication is not socially acceptable. It is not considered stylish, comical or tolerable.
9. Finally, and perhaps most important, there is wide and usually complete agreement among members of the group on what might be called the ground rules of drinking.

## Diagnosis of Alcoholism

The moderate drinker is easily identified. He drinks only at reasonable intervals, maintaining low blood-alcohol levels. His drinking does not interfere with his health, his family, his work, or his community life. He can readily control his drinking patterns, modifying them to what is appropriate for the time and place. Unlike most problem drinkers, who seemingly drink to relieve tension, the moderate drinker has a wide variety of nutritional, medical, social or religious reasons for his drinking.

The last stages of advanced, full-blown alcoholism are also easily recognized. The victim is usually completely unable to control his drinking: he may no longer have an established family life or be able to hold a job. There may also be malnutrition, cirrhosis of the liver or other tissue damage.

Detecting and diagnosing the borderline states of harmful drinking, however, and doing this at an early stage so that appropriate treatment may be started, is a different and far more difficult task.

Unfortunately, there is no "Wassermann test" or other relatively simple diagnostic procedure for alcoholism. Determining the precise point at which manageable drinking stops and dangerous or addictive drinking begins is as impossible as pinpointing the exact moment when safe driving stops and dangerous driving begins.

### The Warning Signs

Individual variation makes it impossible to present a complete list of signs and symptoms uniformly characterizing the early stages of problem drinking. Familiar signs are the need to drink before facing certain situations, frequent drinking sprees, a steady increase in intake, solitary drinking, early morning drinking. Monday morning absenteeism, frequent disputes about drinking, and the occurrence of what are termed black-outs.

For a drinker, a black-out is not "passing out" but a period of time in which, while remaining otherwise fully conscious, he undergoes a loss of memory. He walks, talks and acts, but does not remember. Such black-outs may represent one of the early signs of the more serious form of alcoholism.

But alcoholism may be present without black-outs, and without any of the other popularly accepted symptoms of addictive drinking. Many alcoholics do not go on drinking sprees, or drink alone, or drink in the morning, or miss work on Mondays.

In general, an individual may probably be considered an alcoholic if he continues to drink even though his drinking consistently causes physical illness—headache, gastric distress or hangover—or consistently causes trouble with his wife, his employer, or the police.

Information on the generally accepted characteristics of alcoholics can usually be obtained from physicians, medical societies, clergymen, social workers, Alcoholics Anonymous, state or local health agencies, and national or local alcoholism organizations. For an individual case, however, proper diagnosis may require the services of an expert. Often it is necessary to await the passage of time to determine whether the individual has failed to heed the signs obvious to others that his drinking is causing significant damage.

### The Diagnostic Traps

One of the major obstacles to correct diagnosis is the view of many individuals, both physicians and laymen, that anyone who drinks less than they do is not an alcoholic, or that the only real alcoholic is the Skid Row stereotype. A recent Massachusetts General Hospital study found that a diagnosis of alcoholism was more likely to be made if a patient were poorly clothed, unshaven, separated from his family, unemployed or in trouble with the police. But the correct diagnosis was likely to be missed if the patient were well-groomed, living with his spouse, employed, with no police record, and possessed of health insurance.

In some respects, it appears, the redefinition of alcoholism as a form of illness, a public health and medical problem, has gained more rapid and complete acceptance among the general public and alcoholics themselves than among some members of the medical profession.

In part, the reluctance of some physicians to diagnose alcoholism may be due to a sense of futility and a feeling that they do not have adequate resources or experience to provide needed treatment.

## ADMISSION OBSERVATIONS ON THE SEVERELY WOUNDED

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This is the second of a series of preliminary reports from the Surgical Research Unit at the Station Hospital, U.S. Naval Support Activity, DaNang, Vietnam. A previous United States Navy Medical News Letter report dealt with the *Organization and Logistic Framework of the Shock Study Program*. This report will outline briefly observations made on the casualties treated thus far.

As of 1 April 1968 the shock team has treated 58 patients. Aside from the uniformity of certain parameters such as age and etiology of shock, one of the distinct advantages afforded a shock study unit in a war theater is the opportunity to analyze metabolic alterations prior to the initiation of treatment.

Of the 58 patients treated, the mean age was 18.9 years with a range of 18 years to 26 years. In all instances the patients were in shock secondary to trauma and acute hemorrhage. The diagnosis of shock was made by the usual clinical criteria of pallor, diaphoresis, tachypnea, tachycardia, poor pulse volume, hypotension and narrow pulse pressure. While an abnormally low blood pressure was not essential for patient selection, 36 to 58 patients had admission blood pressures below 80 mm Hg systolic, and 16 of these had no detectable blood pressure.

Regarding mechanism of wounding; 30 patients were injured by booby-trap or land mine explosions; 5 by mortar rounds; 8 by grenade explosions; 11 sustained high velocity gunshot wounds; and the remaining 4 were wounded by a variety of agents.

Twenty-four patients had a total of 33 traumatic major amputations, that is, an amputation of at least a hand or a foot. There were 13 major arterial injuries. Five patients had primarily intra-abdominal wounds of varying magnitude, while 16 patients had concomitant intra-abdominal wounds for a total of 21 intra-abdominal wounds.

There were three broad categories of acid-base disturbance. Seven patients demonstrated respiratory alkalosis, 17 metabolic acidosis and 21 were normal. All patients had abnormal blood lactate levels on admission. The mean level was 46 mgm% with a range of 22 mgm% to 168 mgm% (normal for the method used is 5 to 20 mgm%). This latter observation of course supports the clinical diagnosis of shock.

The mean evacuation time for the patients studied was 78 minutes, range being 10 minutes to 360 minutes. The mean admission hematocrit value of 35%, (range 21% to 46%), and the mean total protein level of 5.6 grams, (range 8.7 grams to 3.3 grams), suggest hemodilution by the shifting of endogenous water to the circulatory system at a rather rapid rate.

One interesting observation in a group of 19 patients was the remarkable elevation of blood sugar seen on admission prior to instituting treatment. In these patients the mean admission glucose level was 242 mgm%, (range 420 mgm% to 133 mgm%). Simultaneous serum samples for insulin assays were obtained and are being performed at the Clinical Investigation Center, Naval Hospital, Oakland, California.

Serum electrolytes and osmolarities were generally normal on admission. The exception was a tendency toward hypokalemia with 29 of the patients having serum  $K^+$  below 3.5 meq/L while only 6 showed any degree of hyperkalemia.

The above data represent some of the initial observations on a group of 58 shock patients treated at the Station Hospital, U.S. Naval Support Activity, DaNang, Vietnam. Subsequent reports will deal with certain of these data in detail and will describe the metabolic and physiologic response to three different resuscitation regimens.



# NATIONAL ACADEMY OF SCIENCE, NATIONAL RESEARCH COUNCIL CONFERENCE ON PULMONARY EFFECTS OF NON-THORACIC TRAUMA, SELECTED COMMENTS

*Prepared by CDR C. E. Brodine, MC USN.*

## Introduction

The pulmonary effects of non-thoracic trauma was the subject of a three day conference in Washington, D.C., beginning on February 29, 1968. The meeting, sponsored by the Committee on Trauma, National Academy of Science, National Research Council, was convened to explore the problems of unexplained pulmonary insufficiency developing in both military and civilian patients after severe trauma. The scope of the conference included a description of the clinical syndrome, pathophysiology, pathology and treatment. The proceedings of the conference will be published in the September issue of the *Journal of Trauma*. In the interest of bringing several recommendations made regarding treatment to the attention of the Medical Corps at the earliest possible date the following information is presented.

## Clinical Syndrome

**Incidence**—No data are available on the incidence of severe pulmonary insufficiency in the battle casualty with non-thoracic trauma. While the absolute incidence is probably quite low, it appears to be found exclusively in the massively injured group. The majority of these patients are being successfully resuscitated without pulmonary insufficiency, however in those who do not survive, pulmonary insufficiency is often a prominent clinical feature.

**Etiology**—A variety of etiologic factors were proposed as playing a potential role in the development of pulmonary insufficiency in the trauma victim. These factors include blast effect, sepsis, neuro-humoral mechanisms, fat embolism, circulatory overload and prolonged exposure to high concentrations of oxygen.

With regard to the question of potential overloading, certain guidelines were suggested as constituting adequate resuscitation. The objective, simply stated, is to restore adequate organ perfusion. The volume of resuscitative fluid administered should not be gauged by formulae nor should it depend on a specific value for arterial pressure or central venous pressure. The aim should be an awake patient, with warm skin, a full pulse, and satisfactory urine output.

Central venous pressure is the function of four measurable and independent forces: the volume and

flow of blood in the central veins; the distensibility and contractibility of the right chambers of the heart during filling of the heart; venomotor activity in the central veins, and intrathoracic pressure. The response of this measurement during resuscitation depends as well on the type of fluid infused and the rate of infusion. Data were presented which showed that the central venous pressure may or may not be a valid indicator to guide fluid therapy. This is particularly true during the initial resuscitation from shock using salt solution. Salt solution used for initial volume reexpansion before crossmatched blood is available can effectively restore organ and tissue perfusion. However, it is possible to infuse a substantial volume of salt solution without producing a sustained elevation of central venous pressure. There was agreement that a central venous pressure above 15 to 20 cm H<sub>2</sub>O indicates that the infusion of additional fluid would be hazardous.

## Clinical Course

A description of the clinical course varied somewhat from observer to observer and the onset occurred from several hours after admission to several days. However, the onset is invariably heralded by an elevation in respiratory rate, and a falling arterial PO<sub>2</sub> associated with an increasing alveolar arterial O<sub>2</sub> gradient. At this point the trachea is intubated and respiration is mechanically assisted. The alveolar arterial O<sub>2</sub> gradient continues to increase despite the addition of progressively increasing concentrations of oxygen in the inspired air. Increasing pressures are required to maintain adequate tidal volume, suggesting a relentless fall in lung compliance and/or an increase in airway resistance. As the patient enters the final phase adequate oxygenation can no longer be maintained and progressive respiratory acidosis ensues.

## Treatment

A discussion of treatment is difficult since no single etiologic agent has been identified. Naturally, the common causes of respiratory difficulty should be sought out and dealt with in the usual manner. These include pneumonia, aspiration and heart failure. In many cases, a specific cause can not be identified.

However, regardless of etiology the following recommendations concerning respiratory support should be considered for the casualty who develops pulmonary insufficiency.

(1) Respiratory support should be considered early rather than late and should be based on changes in the blood gas analysis if available and clinical observation relating to clinical appearance and the ability of the patient to mechanically exchange air.

(2) Initial use of an endotracheal or nasotracheal tube is recommended rather than tracheostomy. The latter has been associated with erosion through the posterior trachea, and scarring and stenosis following mucosal ulceration. Tracheostomy should be considered if respiratory support is required beyond several days.

(3) Initially, a satisfactory arterial  $PO_2$  may be maintained by ventilating the patient with room air. If blood gas analysis is available a low arterial  $PO_2$  should be dealt with by a 20 minute period of 100% oxygen followed by reappraisal of the  $PO_2$ . Partial pressures of oxygen  $<500$  mm Hg following 100% oxygen indicate pulmonary veno-arterial shunting or a diffusion defect of varying degree. The concentration of oxygen in the inspired air should be adjusted to the minimum amount required to maintain

an arterial  $PO_2$  of 60 to 120 mm Hg. Frequent cautious trials of reduced inspired  $O_2$  should be attempted, while monitoring the blood gases. If increasing concentrations of oxygen are required the continued use of 100% oxygen to achieve at best a few millimeters increase in arterial  $PO_2$  is ill-advised. Data were presented at the conference which demonstrated pulmonary pathology similar to "shock lung" following prolonged exposure to high concentration of oxygen. Adequate management of these patients requires the availability of blood gas analysis.

(4) Finally, it should be remembered that most pressure cycled respirators are driven by compressed oxygen and that the oxygen concentration setting on the instrument may not reflect the actual concentration of  $O_2$  administered. Potentially hazardous high concentrations of oxygen can be avoided by driving the system with compressed air and adding oxygen to the system in appropriate amounts as necessary. The concentration of oxygen in the inspired air should be monitored with a relatively inexpensive bedside oxygen analyzer.

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The civilian participants in the conference were high in their praise of the care the combat casualties are receiving in Vietnam at the hands of the military.

## PORTSMOUTH NAVAL HOSPITAL TRAUMA SYMPOSIUM

On the 14th of March 1968, the Portsmouth Naval Hospital was the scene of a symposium on the treatment of combat incurred soft tissue injuries. Approximately 350-400 doctors from the surrounding Tidewater Area and from military installations along the East Coast gathered to hear a group of outstanding surgeons discuss the management of combat-incurred soft tissue injuries. Among those attending were the Surgeon General of the Navy, Vice Admiral R. B. Brown; the Assistant Chief of the Bureau of Medicine and Surgery for Professional Affairs, Rear Admiral Frank Norris; the Inspector General of the Bureau of Medicine and Surgery, Rear Admiral Felix Ballenger; and the Commanding Officer of the Naval Hospital, Bethesda, Maryland, Captain David P. Osborne. The panelists included two Navy surgeons who recently returned from duty in Vietnam and three civilian experts in their respective fields. Although the central theme of the symposium was

combat incurred injuries, it was repeatedly emphasized that the automobile is a most formidable adversary when it comes to inflicting trauma to our servicemen during time of war or peace.

Dr. Ben Eiseman, Professor of Surgery at the University of Colorado, was the Moderator and started the symposium with his comments and observations on the *Initial Resuscitation of Severely Wounded Patients*. Dr. Eiseman discarded the usual approach to this subject and directed his remarks to areas of controversy in which there are differences of opinion in the management of the severely wounded patient. He emphasized six areas: (1) tracheostomy, (2) oxygen toxicity, (3) the role of sodium bicarbonate, (4) the problem of central venous pressure monitoring, (5) initial resuscitation in regard to administration of fluids, and (6) the pulmonary effects of non-thoracic injuries. Dr. Eise-

man emphasized that tracheostomy patients are extremely difficult to handle and raised the question of transportation. He wondered if they shouldn't be considered as non-transportable patients. He further emphasized the problems that are well known in the establishment of tracheostomy in the burn patient and suggested that perhaps too many are being done in this type of patient. He said that an alternative to establishing a tracheostomy was to use the endotracheal or nasotracheal tube. Dr. Eiseman said, "Let's not perform a tracheostomy if we can establish a good airway by an endotracheal or nasotracheal tube."

He interjected a word of caution, however, and suggested that we not go overboard in our zeal to correct the problem of too many tracheostomies, and emphasized that tracheostomies are a good thing when clear-cut indications exist or when attempts to establish an airway by means of an endotracheal tube fail.

The second point of controversy was in regard to oxygen toxicity. Dr. Eiseman felt that oxygen toxicity in the severely injured patient is a rare occurrence. He thinks that the use of 100% oxygen for a 12 to 24 hour period is not dangerous. He encouraged the group not to hesitate to give 100% oxygen to the severely injured patient; however, he cautioned that when the patient begins to respond to resuscitative measures, start to wean him off the oxygen. This is not to say that oxygen, when used for prolonged periods of time, is not dangerous. He emphasized that for short periods of time for the severely wounded patient, one should not neglect to use 100% oxygen in conjunction with other resuscitative measures.

A third controversial point was the use of sodium bicarbonate. Dr. Eiseman cautioned that too much sodium bicarbonate was being used in the treatment of the severely wounded patient. He revealed that in the Navy Research Unit at DaNang many of the severely injured patients were coming in with respiratory alkalosis and not metabolic acidosis. He felt that a great deal of sodium bicarbonate is being given on an entirely empirical basis. He has no quarrel that alkalization improves the tone of the heart when acidosis exists. However, he pointed out that in cases of pulmonary insufficiency, additional problems may be caused by loading the patient with sodium bicarbonate. This overload of sodium may contribute to the establishment of pulmonary edema and further pulmonary complications. He also pointed out that over alkalization retards the release of oxygen from hemo-

globin. Dr. Eiseman has no quarrel with the fact that the administration of sodium bicarbonate to a patient with metabolic acidosis is a good thing. He only made a plea for moderation and suggested that instead of empiricism in the use of sodium bicarbonate, the various Research Units which have sophisticated laboratory facilities to determine the needs for alkalization, attempt to establish some clinical signs which will enable the surgeon to quickly determine the presence or absence of acidosis or over-alkalinization.

A fourth point of contention that Dr. Eiseman discussed was the use of the central venous pressure. He feels that this is being regarded as another "sacred cow." Everybody knows that the central venous pressure monitoring is good. However, he cautions against the use of the subclavian vein in measuring the central venous pressure. He feels that the complication rate in using this route is too high and he prefers to use the jugular vein. He further emphasized that central venous pressure measurements are not the "end-all" as to whether you've caught up with the patient's fluid replacement. He feels that the future will show that monitoring of the pulmonary artery oxygen saturation will be a better method of determining the adequacy or inadequacy of fluid replacement.

A fifth controversial point that Dr. Eiseman discussed was the use of crystalloids in the replacement of blood. He maintained that Ringer's lactate, or any other crystalloid, can be used from the very outset until matched whole blood is ready. He stated that our knowledge of the role of hemodilution has changed over the past year and that there is no actual "inappropriate" decrease in the extra-cellular fluid volume when blood is lost. He pointed out, that the oxygen carrying capacity of blood is sufficient even when the hematocrit drops to 28% or even 10%. However, one must have adequate pumping action of the heart to maintain adequate perfusion. In a clinical study he showed that in a group of 86 patients, three times the measured amount of blood loss could be replaced before one was required to use blood. This does not mean, however, that blood cannot or should not be used whenever matched whole blood becomes available. He interjected a word of caution in regard to blood transfusion, pointing out that there is a mortality rate of one in every 1,000 patients transfused, and a non-fatal reaction such as hepatitis, of 2%. Dr. Eiseman said, "There is a disadvantage to using crystalloids; namely, it leaks into the interstitial space and while this is not bad when it occurs in the ankles, it can be a very serious prob-



lem when the leak occurs in the interstitial space of the lung." He made a plea for modernation in the use of crystalloids and emphasized that crystalloids can and should be used in large volumes until matched whole blood is available.

The last area of controversy that Dr. Eiseman discussed was the pulmonary effects of non-thoracic injury. Although this is not a common phenomenon, the clinical picture is usually that of a person in shock for one or two hours, who has no injury to the lung or chest, but who over the next six to eight hours to three or four days begins to develop pulmonary insufficiency, dyspnea, increased CO<sub>2</sub> retention (without cyanosis), and ultimately dies if not treated properly. The questions he asks are, "What is it? Is it fat embolism, over-infusion of fluids, oxygen toxicity, or is it due to the fact that these patients lie on their backs for long periods of time? Is it due to micro-thromboses in the pulmonary bed, the 'shock lung,' too much alkali, or is it due to the blast affect of the lung?" He had no positive or conclusive answer; however, his advice was "If you suspected the syndrome, go very lightly on crystalloid solutions." He felt that one therapeutic measure that had some merit was the administration of positive-pressure. He emphasized not intermittent positive-pressure, but positive positive-pressure. Dr. Eiseman concluded his lecture by advising all who had the opportunity to serve in Vietnam to do so because the solution to many of our problems that exist today may lie in the experience gained in the treatment of casualties as they are returned from the battlefield.

CDR Mitchell Mills, (recently returned from Vietnam where he served aboard the USS REPOSE (AH-10)) spoke to the group about his experiences in *Management of Combat Chest Injuries*. CDR Mills quickly took the group through a brief historical sketch covering World Wars I and II and the Korean conflict showing the tremendous progress that was made in the treatment of chest injuries over that brief period of time. Dr. Mills then directed his attention to the review of 56 cases of chest injuries treated aboard the REPOSE. He stated that he had a 38% complication rate and a 6% mortality rate. Of significance were the 41 cases in which there were absolutely no complications and the injured Marines were sent either back to duty or transferred to a hospital in the Continental Limits of the United States to convalesce. Of the four deaths that he reported, three were due to pulmonary edema. Dr. Mills pointed out that there was nothing new in the management of chest injuries during the

Vietnam experience and that his method of handling these cases was based entirely on the experience of others who had treated combat chest injuries in previous wars. One significant difference that he noted was the use of the large bore chest tubes for drainage of the pleural cavity and the use of the more sophisticated Heimlich valve when consideration was given to transporting the chest patient who required pleural drainage.

A portion of his discussion was centered around the management of thoracoabdominal injuries which he emphasized were best treated by laparotomy. Early in the management of these cases several of the patients did not have pleural drainage and he felt very definitely that this was an error and that chest tubes should be used for pleural drainage in all thoracoabdominal injuries. If thoracotomy is to be used at all in thoracoabdominal cases, it should be of a limited variety. Dr. Mills pointed out that thoracoabdominal injuries present a variety of problems and that one must recognize a series of events in the establishment of a thoracoabdominal injury. He emphasized the various points in management by reviewing a series of case reports. One of the facets in treatment of combat incurred thoracic injuries is the management of cardiac wounds and attention must be focused on the treatment of cardiac tamponade.

On the other hand Dr. Mills questioned the value of open heart surgery in the forward areas. Dr. Mills said, "There was some thought, particularly at the beginning of this Vietnam War, about the efficacy of open heart surgery in the forward areas." He questions whether or not lives could be saved by the availability of open heart techniques. "This is certainly still a controversial question," said Dr. Mills, "but we did not see any cases aboard the REPOSE that we thought could have been handled, or should have been handled by open heart techniques, and we didn't hear of any in talking to our colleagues ashore." He added, "We think that's understandable for two reasons. A patient with such major cardiac injury as severe valvular damage, abnormal communications between the great vessels or the heart chambers, or large lacerations of the great vessels, will probably not survive long enough to reach any hospital. If he does, there is going to be a period of instability of his cardiovascular system. It's going to take a significant period of time to resuscitate him and to make an accurate diagnosis of the intracardiac lesion. We all know that without an accurate diagnosis no appropriate treatment can be given." Dr. Mills summar-

ized his thoughts regarding open heart techniques by saying: "Open heart techniques, because of the emergency problem with death on the battlefield and because of the diagnostic problems, are never likely to be too applicable under field conditions."

Dr. Mills, in concluding his presentation, had these three points to make: First, the management of combat chest injuries is best based on a study and knowledge of past experiences. Second, careful history and physical examination is as essential in combat chest injuries as it is in any medical practice to avoid inappropriate treatment of the patient. This history and careful physical examination should be carefully repeated at every step along the evacuation chain, and one should be particularly wary of the patient with hypoxia. Finally, pulmonary edema seems to be still a great hazard in the management of war wounds of the chest.

*Management of Combat Abdominal Injuries* was the subject of the next speaker's presentation. CDR Robert W. Knapp, MC USN, who also recently returned from Vietnam, had duty with the Third Medical Battalion of the Third Marine Division. He directed his remarks toward the mechanics of treating the patient with abdominal injury. Dr. Knapp said, "There are now facing each other in the triage tents in Southeast Asia, some of the most fortunate patients and surgeons who respectively may have consulted or have been consulted. They are more fortunate than others in previous wars because the patient who has sustained an abdominal wound and the surgeon who must treat that wound, now begin their relationship in the knowledge that the chance for a successful outcome is approximately twice that of the Korean Conflict." The unique nature of the Vietnam Conflict, the recent advances in medical technology, and the widespread use of the helicopters, Dr. Knapp feels, have combined to effect rapid transportation of a wounded individual to a place where definitive care is available by trained surgeons. He stated that the medical facilities, because of the static nature of this war, have had a chance to physically "mature." Dr. Knapp explained that the combat surgeons started with their tents, operating on the ground; they put in a floor; then they put a roof over the tent; and finally they put in a concrete floor. Eventually many of these places have evolved to their operating rooms being Quonset huts which are air-conditioned.

The speaker stated that the ratio of small arms wounds to fragmentation wounds was approximately 60% to 40%. He said that the fragmentation wounds really tested the imagination of the surgeon

because of the unpredictability of the course of the missile fragment and the extent of their damage. Dr. Knapp felt that the fiberglass jacket (the body armor type of jacket) has materially reduced the severity of upper abdominal and chest injuries, and that the body armor was of value even though the wearing of this armor was unpopular among the Marines. He said that in a hot, tropical climate, the wearing of the body armor was not the most popular uniform of the day. Moving on in his discussion of management of abdominal injuries, Dr. Knapp emphasized that in the triage area one must remove all of the patient's clothing and remove all of his dressings even though it may mean reapplying the same dressing over the same wound. He felt that it was mandatory that a complete evaluation be done in the triage area. It is also extremely important to remove all the dirt and filth that covers the patient and this can be done adequately by employing a "water hose technique" and gently shower the entire body. In cases where there is evisceration of intra-abdominal contents through the wound, the viscera should be thoroughly but gently irrigated, removing all the soil from the viscera and covering them with a moist dressing.

Dr. Knapp proceeded to talk about the diagnosis of penetrating wounds of the abdomen. He said, "In most cases the extent of the wound is obvious, however, in other cases it may not be so obvious and it may be necessary to use adjunctive diagnostic procedures." Dr. Knapp said that multiple plain x-rays of the abdomen were helpful, but certainly not the key to the problem. He thought that injection of radio contrast material was not a very practical approach to the problem. One method that he felt to be of particular help was local exploration of the wound after thorough cleansing and preparation of the patient. He said that in many instances in the poor risk patient, exploration under local anesthesia would establish beyond a doubt the need for further operative intervention. He felt that in the final analysis the best criteria for determining the extent of the injury was the overall clinical judgment. Dr. Knapp felt there was no place for the use of selective exploration as proposed by some civilian centers in the management of stab wounds of the abdomen. A combat surgeon's basic rule is that anyone with a wound on or near the abdomen must be thought to have a visceral penetration until proven otherwise.

Dr. Knapp paid tribute to the study done at Clark Air Force Base in which 1,300 cases of casualties from the forward areas were reviewed and only

seven cases were found that needed an exploration because of an overlooked perforation at the time of the initial assessment. Dr. Knapp felt that this was further evidence to support the combat surgeon's approach to management of penetrating wounds of the abdomen. Dr. Knapp said that the almost universally accepted incision for carrying out abdominal exploration under combat condition is the midline incision because it can be carried out in a most rapid and efficient manner. He emphasized, however, that no incision should be less than 10 cms. in length. He made a plea for systematic exploration of the abdomen referring again to the 1,300 cases reviewed by the Clark Air Force Base Hospital. He mentioned that of the 91 reoperations performed for various reasons, 11 of these were done for injuries missed at the initial exploration. Dr. Knapp was not being critical of the doctors who did the initial exploration because he said that often in the high velocity wound, the extent of the damage could not adequately be assessed until some hours after the injury.

Dr. Knapp stressed the importance of using special techniques for exploring areas in which injuries are suspected. He listed these as division of the peritoneal suspensions of the liver when one suspected injuries over the dome and posterior aspects of the liver and in and about the esophagogastric junction. He stressed that the lesser sac should be explored when the injury was felt to involve the posterior aspect of the stomach or the pancreas. The hepatic and splenic flexures should be mobilized for colon lacerations thought to penetrate posteriorly and the duodenum should be Kocherized for wounds that extend about the head of the pancreas. Dr. Knapp said, "Upon entering the abdomen, control of bleeding is the priority maneuver. Once bleeding is controlled then one must begin the systematic exploration." He emphasized that initially the perforation in the bowel should be tagged and further soilage prevented by either an encircling ligature or an inverting suture. If the peritoneal cavity has been grossly contaminated, one should start large doses of antibiotics and once all of this is done, the surgeon can then step back and reassess the situation before he goes on. Dr. Knapp emphasized that in this reassessment, the surgeon should consult freely with the anesthesiologist regarding the need for further blood, fluids, management of extremity wounds, calling in other consultants, etc. "Once these things have been assessed," Dr. Knapp said, "then one can go back to the tagged perforations, either resecting those areas of small bowel where the

perforations are limited to one segment, or if possible, closing each perforation individually." Dr. Knapp preferred the use of interrupted silks placed transversely where possible to close small bowel perforations.

Dr. Knapp said, "As far as the treatment of liver injuries is concerned, the day of packing the liver laceration with large tapes is gone, and that the only time that this can or should be used is when both lobes of the liver are involved." Generally, he divided liver lacerations into three groups: (1) a relatively minor wound in which there was a slight tear in the liver with little or no bleeding, (2) the second group where the liver parenchyma was shattered but limited to one lobe, (3) and the third group where there was massive destruction of one lobe of the liver. He felt that in the treatment of these three categories the first group provided no problem inasmuch as the surgeon could very simply control the bleeding by either a suture through the liver parenchyma or by applying Gelfoam to the area. He also felt that the third group presented no problem in deciding what ought to be done because once all the pieces of massively destroyed liver were removed, this for all practical purposes constituted a lobectomy of one sort or another and the bleeding could be stopped as expeditiously as ingenuity would allow. The second or middle group, he felt, constituted a real challenge to the surgeon since he would have to decide whether or not a lobectomy was necessary after controlling the bleeding. Dr. Knapp said that this required keen judgment on the part of the surgeon since review of the reoperative statistics revealed a prohibitive mortality in those patients in which it was necessary to go back and do a lobectomy at a subsequent time. Dr. Knapp said that all liver wounds should be drained and the larger or more extensive the wound; the larger the drain, and the greater the number of drains. Dr. Knapp questioned the role of the T-tube. He mentioned that in large wounds the T-tube was used. In the smaller wounds he felt that the T-tube was not harmful, but he questioned the value or necessity of this maneuver. He said that all lacerations of the gallbladder required a cholecystectomy.

Dr. Knapp felt that wounds of the stomach were no great problem, however, he cautioned against the use of a gastrostomy tube through a repaired rent. He also emphasized that posterior wounds of the stomach were best examined by opening the lesser sac through the gastrocolic omentum and examining the serosal surface of the stomach rather than attempting an examination through the mucosal por-



tion of the posterior aspect of the stomach. In regard to pancreatic injuries, Dr. Knapp's opinion was that these were infrequent. He said that injuries to the tail and body of the pancreas could be treated by resection and although injuries of the head of the pancreas treated by pancreaticoduodenectomy were accompanied with a rather high morbidity and mortality rate, it still provided the patient the best chance for survival. He did not dwell on management of trauma to the spleen and indicated in general terms that the same rules applied in combat as applied in civilian hospitals.

"There is very little difference of opinion in the management of wounds of the colon beyond the hepatic flexure," Dr. Knapp said. All the argument is on the right side. He said that all the basic rules that applied to management of left-sided colon injuries in previous wars applied in this war. Small wounds are exteriorized. In shattered wounds of the colon the segment is resected and a proximal colostomy is performed as an end-colostomy and a distal mucous fistula is established with the other end. He emphasized that the stomata do not have to be in the same place, that is, they do not have to be brought out as a double-barrelled colostomy. He indicated that if the colon cannot be immobilized, then one can close the rent in the lacerated colon and do a proximal colostomy. He thought it was extremely important in damage to the pelvic colon and rectum that the distal segment, whether or not one uses a mucous fistula, be cleaned of stool. He thought that this was especially important where there was extensive wounds of the perineum and buttock. He said that this cleansing could be done with copious irrigations of normal saline solution.

Dr. Knapp said that World War II and the Korean Conflict convinced surgeons that right colon injuries should be handled conservatively. In this war it has been proven that ileocolostomy can be done in wounds where there is not extensive damage to the right colon or gross contamination of the peritoneal cavity. Dr. Knapp indicated that experience has shown that because of the extensive loss of fluid and electrolytes, there is no place for exteriorization of wounds of the right colon. He felt that in massive injuries of the right colon that it was best to resect the right colon and do a terminal ileostomy and a distal colostomy. Dr. Knapp felt that the reason surgeons in Vietnam were able to do ileocolostomies, in selected cases, was that the patients were being seen earlier and the effects of contamination was not as great. The anastomoses were not breaking down.

At this point Dr. Knapp digressed a bit in his discussion and praised the use of the helicopter. He added, that while everyone praised the helicopter, little attention was given to the very effective use of the fixed wing aircraft "in-country" to transport casualties which had been triaged. He commended the superb role these personnel were doing in this phase of the war. Dr. Knapp said that under some conditions bad weather and the distance needed to travel would make the use of the helicopter impractical and that the effect of the use of the fixed wing aircraft was to allow the Medical Department to use all of its facilities more efficiently when large numbers of casualties were received. Dr. Knapp concluded that although we may well be optimistic over our mortality statistics he would sound a note of caution. He noted that as the efficiency of our air evacuation increases, the challenge to the surgeon becomes even greater. Dr. Knapp stated that patients are now being seen with wounds of such magnitude that in previous wars were only known to the graves registration people. Dr. Knapp said, "The mortality among patients who reach a definitive care center is approximately 1% and probably much of this 1% is made up of the patients with these severe wounds." In his concluding statement, Dr. Knapp said, "The challenge is much greater to all of us because if we are to improve our statistics, the improvement must be extracted from this final, last, almost futile 1%."

*Management of Trauma to the Genitourinary System* was the subject of the presentation given by Dr. J. Hartwell Harrison, (Elliot Carr Cutler Professor of Surgery, Harvard Medical School, and Chief of Urology at Peter Bent Brigham Hospital) emphasizing that most of the injuries incurred in the service are due to crushing injuries sustained by vehicular accidents. Dr. Harrison pointed out that the problem of genitourinary injuries is not one of the most common with regard to combat wounds for appropriately the organs of the genitourinary tract are protected in such a way that they are not frequently wounded by shrapnel or small arms missiles. Dr. Harrison reviewed the statistics from World War II showing that 14% of abdominal wounds inflicted during that conflict resulted in injury to the kidney with a resultant high mortality. Dr. Harrison hastened to point out that the mortality was not high just because of the injury to the kidney, but that when the kidneys were injured, it usually meant there was multiple organ involvement. He showed that the highest mortality rate was noted in the German army where they had an 87% mor-

tality figure. In the British armed forces this mortality figure was 55% while in the U.S. Forces it was 44%.

In his introduction to a brief review of renal physiology, Dr. Harrison said, "The kidney is the most intelligent organ in the body." In addition to a review of renal physiology, he also covered some of the important anatomical features related to renal surgery. He pointed out that 20% of people have more than one renal artery on the left and 10% have more than one renal artery on the right. However, in regard to the venous drainage, only 3% have multiple veins on the left whereas 15% have multiple veins on the right. Dr. Harrison reminded the audience of the early work of John Hunter (approximately 150 years ago) who pointed out that the veins of the kidney and spleen anastomosed freely with one another, an important fact when one considers surgery on this important organ. Dr. Harrison further pointed out the important role of the kidney in response to shock and injury, demonstrating by means of slides the occurrence of renal cortical ischemia and acute tubular necrosis as an indirect response to trauma. He also showed a slide of hyperplasia of the juxtaglomerular apparatus which occurs when the kidney is subjected to ischemia. The juxtaglomerular apparatus, Dr. Harrison pointed out, is responsible for the elaboration of renin and stated that the highest levels of renin occur in persons in shock. Dr. Harrison emphasized Dr. Eiseman's remonstrance about the excessive use of sodium bicarbonate. Dr. Harrison said, "I think that we do use this initially when we expect there has been or is a lot of heme pigment in the patient with severe shock. If sodium bicarbonate is given early, perhaps 44 or 88 milliequivalents, it may increase the solubility of these products and perhaps protect the patient a little bit against the tubular necropathy that may otherwise occur."

By means of a series of slides, Dr. Harrison demonstrated representative procedures used for non-traumatic conditions employing the use of partial nephrectomy that are analogous and could be applied in the treatment of traumatic injuries. He issued a word of warning to all who care for trauma of the abdomen and specifically to trauma of the kidney to ascertain the presence of the opposite kidney before beginning surgery on the kidney. Dr. Harrison also reviewed a series of injuries to the bladder and urethra that occur in crush injuries to the pelvis and emphasized that the care of these injuries is the responsibility of the general surgeon, the urologist, and the orthopedic surgeon. Dr. Harrison

reminded the audience that the involvement of the spinal cord in these injuries is of great importance. If the injury to the cord is above S1, the patient may come out of it with a bladder that functions very well, but if it is below S2 he is likely to have a poorly functioning bladder—most likely a paralytic or autonomous type of bladder. Dr. Harrison said, "In assessing the extent of damage to the bladder and urethra following trauma to the pelvis, the idea is to pass a urethral catheter and if it goes through into the bladder we can assume the urethra is in pretty good shape. A rectal examination will show us that the prostate is in normal position and injecting in a little opaque dye through the catheter may show a small extravasation. "This is best exposed and, of course, the operation is a transperitoneal operation always because there may be accompanying injuries to other viscera therein." Dr. Harrison suggested that one of the clues to urethral tear is the inability to palpate the prostate on rectal examination since the prostate will retract in a cephalad manner with the bladder after the tear. His method of repairing this type of tear is to pass a catheter through a suprapubic cystotomy wound and, using the Foley catheter bag as traction, snug this down to the membranous urethra. He related a recent experience of a surgeon who, in Vietnam, split the symphysis pubis exposing the membranous urethra and by a direct approach, sutured the torn urethra. Dr. Harrison pointed out that he had no experience in this method of repair, but that he thought the idea had merit. Dr. Harrison, in conclusion, emphasized the great morbidity that resulted in the abuse of the indwelling catheter and the establishment of continuous drainage. He was complimentary, in regard to the service hospitals. He said, "I do believe that in the Armed Forces we have the best care of the catheter that occurs in any hospital, and I say this advisedly and on the basis of experience because the Corpsman takes pride in the care of the catheter used for constant drainage. I'm sure that he has been taught the tremendous importance of this and that this will prevent the loss of one or both kidneys."

Dr. Charles A. Hufnagel, Professor of Surgery at the Georgetown University School of Medicine, discussed the *Management of Vascular Injuries*. Dr. Hufnagel, at the very onset, emphasized that one of the most important problems in treatment of vascular injuries, lies in its recognition. Dr. Hufnagel said that late recognition is often a problem resulting in amputation and that amputation is the dreaded complication of arterial disease. He said, "We should perhaps recognize that arterial injuries tend to

occur from four major types of trauma. One is sharp penetrating trauma which is perhaps the most desirable of all if one has to have an injury of the major vessel, and the second is that of compression. The third is that of direct concussion, and the fourth is that of deceleration. Any one of these direct traumatic methods may be either fatal or will result in the loss of complete continuity of the artery." Dr. Hufnagel added a fifth type of trauma, iatrogenic trauma. He said, "Iatrogenic trauma is not nearly so rare as we might suppose."

"In the face of arterial injury one major objective must always be kept in mind," Dr. Hufnagel said, "and that is that at all costs one must attempt to restore the major arterial continuity and maintain the distal blood supply if this is a major vessel to an extremity or to a visceral organ." He added further, "Only by doing this can one really have what can now be surgically acceptable as a satisfactory repair." Dr. Hufnagel warned that "infection in all accidentally infected wounds is ever present. For this reason a direct anastomosis is desirable because one can do a direct anastomosis after an adequate debridement of the wound with the very reasonable degree of safety and anticipate a good result without intervening infection." He elaborated further, "Infection in arterial wounds is a tremendous problem, and once one has a true bacterial arteritis, it is virtually impossible to salvage that artery within the region of the infection." In discussing bullet wounds to the vascular system, Dr. Hufnagel said, "One must recognize particularly in the face of the high velocity bullet wounds of arteries that there is an area of compression damage adjacent to the area of immediate trauma." He added further, "Bullet wounds on the whole tend to have a much more ragged edge. There is hematoma which frequently is seen extending into the wall of the vessel but this in itself does not necessarily show the area of damage, so that when one is dealing with high velocity wounds, it is necessary to remove a segment of the artery. So one is faced then with a number of choices as to how this repair can be best achieved. One way is the use of the autogenous vein graft. Actually, the saphenous vein or the superficial femoral vein is about the only vein which is satisfactory for such use. The saphenous vein is particularly good because the character of the wall is distinctly better. It becomes arterialized better; however, it does have the disadvantage in some people of being small. One must always reverse the vein or remove all of the valves. In a contaminated wound of this type, prostheses should not be used."

Dr. Hufnagel made reference to the previous work of Vice Admiral Brown—"Admiral Brown and his co-workers did some very interesting work in infected wounds in the use of formalinized autografts and this is another type of prosthesis or foreign material which can be used in such wounds, with a relatively high degree of success." One of the problems the surgeon frequently encounters in dealing with vascular anastomoses is the secondary infection. Dr. Hufnagel's comments in this regard were, "I sense that sterilization of the wound after a secondary repair had been fraught with failure. There are two methods which have been employed which occasionally have worked and one of these is irrigation with solutions of Bacitracin. The second one is the mobilization of adjacent muscle after debriding of the wound bringing over fresh muscles to cover over the area of the suture line in the anastomosis and then constant irrigation with Chlorpactin. This is the modern version of Dakin's Solution basically, but still has been an extremely effective method in the sense that we have been able to heal about five or six such infected prostheses or infected anastomoses which we never were able to do by any other means. We also have had an equal number which did not respond to this method. When this is true one must bypass the entire field and after hemorrhage control and ligation of the immediate areas one must isolate this field and bypass from a clean area around the infected area into a distal clean area. This is the only satisfactory and safe approach once one has this kind of secondary problem."

Dr. Hufnagel covered a vast variety of problems in regard to vascular injuries ranging from the pulsating hematoma to the arteriovenous fistula and to lacerations of the aorta. He also touched upon the problems of intracardiac injuries due to penetrating wounds of the heart. He concluded his presentation by a word of warning in regard to implantation of an extremity following partial amputation. Dr. Hufnagel summarized his impressions in the following manner: "The reimplantation of extremities has received new impetus in the past few years. This is not a new concept as you are all aware and experimental attempts are now about 50 or 60 years old. I think that one should be extremely careful in electing reimplantation. It should be reserved for those injuries in which there is little loss of tissue and which the crushing portion of the trauma is minimal. The attempts to reimplant an extremity which has suffered major crush beyond the immediate area of amputation, I think, is dangerous and hazardous to



the life of the patient and it does not ordinarily result in a functional extremity. The restoration of arterial continuity is usually much simpler than the restoration of venous continuity, and if one does not have an adequate venous outflow then the reconstruction is doomed to failure. The same thing is true if one has sufficient loss of bony continuity that one must produce a markedly abnormal extremity in terms of length."

Following these five papers the panelists discussed questions from the audience. Many of the problems discussed overlapped into each of the panelist's field of endeavor. The participation from

the audience was particularly gratifying in that there were many more questions asked than the panelists had time to answer.

The day's events were topped off by a cocktail party and banquet that evening following which Lieutenant General Lewis Walt was the guest speaker.

General Walt, paid special tribute to the dedicated Medical Corps personnel who, through their skills and devotion to duty, contributed so very much in the care of the sick and wounded servicemen in Vietnam.

## HAND LOTIONS—A POTENTIAL NOSOCOMIAL HAZARD\*

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Many reports describing the increased occurrence of Gram-negative bacterial infection in hospitalized patients have appeared in the past few years. An annual analysis of positive blood cultures at the Saint Vincent Hospital depicts a significant decrease during the past five years in the occurrence of septicemia due to *Staphylococcus aureus* and an increase due to gram-negative bacteria, particularly *Escherichia coli*, *Klebsiella pneumoniae*, *Enterobacter* (*Aerobacter*), and *Serratia marcescens*. The increased total number of blood cultures taken per year is attributed to an additional 140 hospital beds made available in 1965, and the continued emphasis that multiple blood cultures be drawn both before and after antibacterial therapy.

Infections due to *S. marcescens* (chromogenic and nonchromogenic), an organism previously thought to be nonpathogenic, have been reported with increasing frequency. This bacterium is classified with the Enterobacteriaceae, and its biochemical reactions include it in the *Klebsiella-Enterobacter* division. Only 25 percent of unselected *Serratia* strains produce the classic detectable red pigment, and, hence, the remaining strains can easily be confused with other closely related organisms (previously labeled

paracolon group). The infections caused by *S. marcescens* highly suggest transmission by contaminated hands—that is, infection at the site of phlebotomy, umbilical-cord colonization, wounds, burns, pulmonary system in patients with a tracheostomy (especially those in whom respiratory-assistance equipment is employed), genitourinary system in catheterized patients and, indeed, meningitis after lumbar puncture. Our most recent experience involved a 24-year-old woman hospitalized because of pulmonary emboli secondary to thrombophlebitis of the pelvic veins associated with early pregnancy. A venous catheter was inserted for the administration of heparin, and she became abruptly febrile on the tenth hospital day. Cultures from the blood and from the removed venous catheter grew nonchromogenic *S. marcescens*. The patient was critically ill, and recovery was associated with the administration of pharmacologic doses of chloramphenicol (100 mg per kilogram of body weight). A spontaneous miscarriage occurred during convalescence.

Our initial publication described the only recognized source of an outbreak of septicemia due to *K. pneumoniae* (serotype 18) to be a heavily contaminated hand-cream dispenser. The decanter bottle had been filled repeatedly with a variety of common skin lotions, and it was assumed to have become inadvertently contaminated. This finding called attention to the value of investigating hand lotions as a possible nosocomial hazard. Here, we report the

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Table 1.—Summary of Bacterial Isolates from Hand Lotions

Hand Lotion	Opened Bottles*				Unopened Bottles				Organism
	Positive	Total	Percentage positive	Average concentration per ml	Positive	Total	Percentage positive	Average concentration per ml	
Brand 1	—	—	—	—	9	13	70	130,000	<i>S. marcescens</i>
Brand 2 (Hospital A)	51	69	74	180,000	3	3	100	170,000	<i>P. aeruginosa</i>
Brand 3 (Hospital B)	9	9	100	1,600,000	2	2	100	1,300,000	<i>Esch. intermedia</i> ; <i>K. pneumoniae</i> ; <i>A. faecalis</i> ; <i>P. aeruginosa</i> .
Brand 4 (Hospital C)	12	12	100	470,000	3	3	100	420,000	<i>S. marcescens</i> ; <i>A. faecalis</i> .

\* Collected at random throughout hospital.

results of direct culture of commercially available hand lotions from both opened and unopened bottles.

From four of 26 brands examined we have identified an array of gram-negative bacteria (Table 1). One nationally distributed brand (Brand 1), sampled from different retail outlets in two separate communities, contained in pure growth nonchromogenic *S. marcescens* in a concentration ranging from 45,000 to 460,000 organisms per milliliter in nine of 13 previously unopened bottles. The second nationally distributed brand is used exclusively in Hospital A and is distributed to each patient upon admission. *Pseudomonas aeruginosa* in an average concentration of 175,000 organisms per milliliter has been isolated from both opened and unopened bottles.

The other two implicated brands are produced locally and are the only hospital distributed hand lotions used in two additional institutions. From one brand (Hospital B) *Esch. intermedia*, *K. pneumoniae*, *Alcaligenes faecalis*, and *P. aeruginosa* were isolated from all samples (opened and unopened) in a concentration ranging from 44,000 to 7,500,000 organisms per milliliter. This product is commercially manufactured and regionally distributed. In addition to being used as a hand lotion, it is issued to each patient at the time of admission to the hospital and used for skin massages and back rubs. From the fourth brand (Hospital C) non-

chromogenic *S. marcescens* and *A. faecalis* were isolated from all opened and unopened bottles sampled in an average concentration of 445,000 organisms per milliliter. This product is manufactured by the hospital pharmacy and is distributed throughout the institution. It is available commercially from the hospital pharmacy.

The other 22 brands cultured were free from bacterial contamination. However, in most of the hand lotions found to be sterile, only one or two bottles were sampled. In none have gram-positive bacteria been identified.

### Conclusions

All hospitals should be alerted to the potential infection hazard from the use of contaminated hand lotions. Hand lotions are extensively used within the hospital environment, and the recognized increase in infection due to gram-negative bacteria may be related to the use of contaminated products. It is recommended that all hand lotions be checked for sterility until a safe bacterial-free preparation is standardized.

We are indebted to A. Daniel Rubenstein, M.D., Bureau of Hospital Facilities, Massachusetts Department of Public Health, for helpful suggestions.

(The omitted figure and references may be seen in the original article.)

## MEDICAL ABSTRACTS

### TROPICAL SPRUE

F. A. Klipstein, MD, *Gastroenterology*  
54(2): 275-293, Feb 1968.

Considerable progress has been made in understanding the pathophysiology of tropical sprue in

the decade since a review of this subject last appeared in the literature. The study of peroral jejunal biopsies has permitted a more precise delineation of the mucosal lesion; vitamin assays have defined the hematological defect; biochemical techniques have become available which have both facilitated evalua-

tion and delineated new defects of intestinal absorptive capacity; and the efficacy of antibiotic therapy has been confirmed. To cope with this extensive body of information, this review is more general than is customary in progress reports and endeavors to summarize progress of the past decade.

#### MENINGOCOCCAL INFECTIONS AT AN ARMY TRAINING CENTER

R. E. Wolf, MD, and C. A. Birbara, MD,  
*Amer J Med* 44(2):243-255, Feb 1968.

One hundred and twelve cases of bacteriologically proved meningococcal infections over the two and a half year period from December 1963 to June 1966 are reviewed. The spectrum of disease varied from an extremely mild form to an acute fulminating disease leading to death in a matter of hours. Careful observation of all febrile patients with immediate and serial white blood cell counts and repeated inspection for the emergence of petechiae or changes in the sensorium were the essentials of approach to early diagnosis.

Of sixty-eight meningococci that were serotyped, 92.6 percent were group B. Of sixty meningococci that were tested for sulfonamide resistance, 21.7 percent showed partial resistance and 56.6 percent showed resistance.

Gross mortality in the present series was 7.1 percent. Hyperglycemia was present initially in 71.8 percent of the patients tested. Mild azotemia was a common finding early in the course of the disease. Symptoms of acute synovitis were noted in 12.5 percent. Common electrocardiographic abnormalities were wandering pacemaker and nodal rhythms. The occurrence of shock appeared to be secondary to peripheral vascular failure due to damage of the vasculature from the endotoxemia; cardiac failure played a role in some patients.

With the present state of knowledge, the approach to patients with meningococcal disease must be early diagnosis, immediate antibiotic treatment and measures to counteract shock, using the more rational modern concepts of volume replacement, peripheral vasodilators and inotropic drugs when indicated.

#### POTENTIAL MEDICAL PROBLEMS IN PERSONNEL RETURNING FROM VIETNAM

CAPT D. N. Gilbert, MC USA, et al.,  
*Ann Intern Med* 68(3):662-678, Mar 1968.

This review summarizes the communicable diseases that should be considered in military person-

nel returning from Vietnam. It is anticipated that malaria will be encountered most frequently and that patients with diarrheal diseases, hookworm, or fever of unknown origin will be seen commonly. Tropical sprue, melioidosis, plague, and helminthiasis are endemic in South Vietnam and must be considered in the individual patient.

The disease problems of Vietnam are only an indicator of the international scope of medicine today. Whether the patient is a civilian or a member of the armed services, an inquiry into travels abroad is an essential part of every medical history.

#### INSULIN—THE BIOGRAPHY OF A SMALL PROTEIN

Rachmiel Levine, MD, *New Eng J Med*  
277(20):1059-1064, Nov 16, 1967.

Probably no other protein has had so much written about it as insulin. Its widespread use in diabetes since 1922 prompted the rapid preparation of purified, crystalline preparations in large amounts, at low cost. The chemist interested in protein structure had ready access to pure samples and was gratified to find that its molecular weight was reasonably low, and hence that its structural complexity should prove less bewildering than that of the other proteins he had available. From a physiologic standpoint as well, insulin is a fascinating tool because of its rapid and pronounced effects on a great variety of parameters of the metabolism of all three foodstuffs, in addition to its very high potency. Despite the inefficiency and wastefulness of the way by which insulin has to be administered to diabetic patients, 2 or 3 mg of the protein per day suffice to abolish the signs and symptoms of severe diabetes in the human being and to bring toward normal the grossly distorted values of glucose, fatty acids, ketone bodies and so forth.

This article reviews the odyssey of this important molecule from its birth in the beta cell to its ultimate organic destruction in the tissues.

#### DRUGS AS ETIOLOGIC FACTORS IN THE STEVENS-JOHNSON SYNDROME

J. R. Bianchine, PhD MD, et al., *Amer J Med*  
44(3):390-405, Mar 1968.

A retrospective analysis of drugs as possible etiologic factors in 138 cases of Stevens-Johnson syndrome made at five university medical centers from 1952 through 1965 are presented. Three different patterns of clinical presentation are noted. In



the simplest form, the complete syndrome occurs in a setting of good general health with no apparent exogenous drug factors present. The second type is heralded by similar signs and symptoms suggestive of an upper respiratory tract or urinary tract infection for which one or more drugs are administered before the appearance of the complete Stevens-Johnson syndrome. In the third type of presentation, the Stevens-Johnson syndrome follows drug treatment of symptoms unlike the prodromas of the

Stevens-Johnson syndrome. The variety of drugs involved, the possible role of these drugs in the subsequent development of the Stevens-Johnson syndrome and the difficulty in relating "cause and effect" are discussed.

Penicillins were the drugs most frequently associated with the Stevens-Johnson syndrome. The data provide little basis for suspecting long-acting sulfonamides as an important etiologic factor in the Stevens-Johnson syndrome.

## DENTAL SECTION

### 20TH ANNIVERSARY OF THE DENTAL TECHNICIAN RATING

April 2, 1968, marked the 20th anniversary of the Dental Technician Rating. Birthday celebrations were held during the first part of April at many Navy and Marine Corps Activities throughout the world commemorating this anniversary.

Prior to the establishment of a separate Dental Technician Rating on April 2, 1948, Pharmacist's Mates were assigned as dental assistants. During the past 20 years the tasks of the Dental Technician Rating has expanded to include many phases of dentistry. In addition to being trained as chair-side assistants, dental technicians are trained as Prosthetic Laboratory Technicians, Equipment Repair Technicians, Clinical Laboratory Technicians and in the field of medical administration. Most recently dental technicians have become actively engaged in support of the Navy's Preventive Dentistry program, which includes the Children's Preventive Dentistry Program as well as active duty personnel.

Dental Technicians are assigned to various types of Navy and Marine Corps Activities, worldwide. They are assigned to Fleet Marine Units, Seabee Units, and MILPHAP Teams deployed in Vietnam and also ships assigned to the Seventh Fleet. Many are engaged, voluntarily, in the DENTCAP program and other civic-action programs which assist the Vietnamese people.

### FLUORIDATION OF SHIPS' WATER SUPPLIES

Occasionally correspondence reaches the Bureau indicating interest and curiosity on the part of commanding officers regarding the practicality of fluor-

idating ships' water supplies. Past Navy effort has been on the basis of fluoridating the water supply in areas where there are large numbers of dependent children. The benefits derived from fluoridated water have largely been accepted as accruing to teeth during the period of tooth development. There has been intermittent speculation regarding some possible benefit through the washing effect of fluoridated water being consumed by adults. However, this has been discounted as being inconsequential. There is no need for fluoridating the water supply of Navy ships.

### DENTAL APPOINTMENTS AND AUTOMATIC DATA PROCESSING

Being ever alert to applying new knowledge and new systems to the everyday practice of dentistry, some dental officers have adapted Automatic Data Processing (ADP) to the recall of patients for treatment especially in the Preventive Dentistry Program. Such initiative is commendable. It is expected that sometime in the future, the recall of patients on a Navy-wide basis will be accomplished through the adaptation of ADP systems to such use. With this thought in mind it is considered timely to suggest that dental officers instituting this method of recall be advised that the implementation of such a system on a Navy-wide basis would probably relate the recall date to birth-months.

Accordingly, this Bureau is desirous of receiving reports of experience gained by those activities which have been utilizing ADP recall systems. Of particular interest are problems encountered, efficiency

gained or lost by the use of such systems, and comments in general. Reports should be addressed to Chief, Bureau of Medicine and Surgery, Code 6, Department of the Navy, Washington, D.C. 20390.

### AN EVALUATION OF THE PREVENTIVE DENTISTRY PROGRAM

To maintain the status quo of a program is the prelude to its rapid deterioration. Any worthy program needs constant evaluation if it is not to stand still. Evaluation is really part of each step in the development of a preventive dentistry program. Considered as a separate step, evaluation is concerned with the operation of the entire program. It is used to estimate progress and to redirect the program as required.

In July 1967, Admiral Kyes, Chief of the Dental Division, suggested we evaluate the Preventive Dentistry Program on the basis of types and amounts of dentifrices sold in Navy Exchanges, Marine Corps PX's and ship's stores. This approach to evaluation is important from several points of view. In a preventive dentistry program helping people to help themselves is just as important as direct dental care. Indeed, if one concentrates upon prevention of disease, self-help is much more than half the battle. Dental health education is, therefore, a major endeavor. Stannous fluoride dentifrice sales would then provide this Bureau with a measure to determine whether we are getting our message across—that the daily practice of oral hygiene is important and that the three-agent stannous fluoride treatment is more effective if a dentifrice containing  $\text{SnF}_2$  is used.

Three hundred forty-five Navy Exchanges, Marine PX's and ship's stores reported they sold 2,770,505 tubes of dentifrice in a three month period, or approximately 1,000,000 per month. Of the total, 1,485,926 tubes sold were Crest, Cue, Fact or Super Stripe or 53.6% of the total dentifrice sales.

The sale of  $\text{SnF}_2$  dentifrices varied from Zero (0) on one ship to 100% on the USS BACHE (DD 470) and USS PROTEUS (AS 19). Shore station retail store sales varied from a low of 11% at one Marine Corps PX to a high of 99% at U.S. Naval Academy.

The national average for sales of stannous fluoride dentifrices is 35%. We are doing at least 50% better than the civilian population; however, we cannot rest on our laurels. We must continue to evaluate our dentifrice sales to see if we are getting our message across. The question is, "Are you, your-

self, giving this problem constructive, solid and continuing attention?"

### "NEW LOOK" TRAINING GETS DENTAL STUDENTS SHIP-SHAPE FOR NAVY TOURS

A stepped-up training program for 28 dental students commissioned in the U.S. Navy Reserve has been launched this year by the 4-12 Student Dental Company headquartered at the Case-Western Reserve University (CWRU) School of Dentistry.

Through the new program the standard weekly Reserve meetings involving lecture courses on basic naval subjects are being amplified by training field trips. Chiefly responsible for the program's new look is LT Thomas A. Wight, Executive Officer and training officer for the company, and a 1965 graduate of the CWRU Dental School.

Recently, LT Wight arranged a shipboard orientation for the student dentists aboard the Cleveland-moored USS WHITEHALL, a 185-foot patrol craft escort used for training by Reserve units in the Fourth Naval District.

"This kind of program—getting out and seeing things for yourself—generates an amazing amount of interest." It's one thing," LT Wight says, "to show slides of a ship and try to explain various naval terms associated with it, but the really valuable experience for the new officer comes when he's actually aboard a vessel and can get firsthand knowledge of a ship's operations."

LT Wight is trying to arrange a weekend trip to Grosse Isle, Michigan, to familiarize the student dentists with Navy jet aircraft at the Naval Air Station there. He is hopeful of taking the company on a "Lake Erie shakedown cruise" aboard the WHITEHALL later this spring.

"Everything we're doing is aimed at trying to prepare the student in a practical way for his active duty tour after graduation," he explained. "A basic knowledge of Navy aircraft, for example, will be useful to the dentist assigned to an aircraft carrier or air station. It will help him in establishing a rapport with the pilots who will be his patients."

"LT Wight has done an outstanding job of instilling interest in the training program," said CAPT Joseph E. Holliday, Commanding Officer, also a CWRU Dental School graduate. "I feel the program we're running now has a sense of immediacy. We are trying to keep the immediate aspects of the military in the student's mind to help him make as smooth a transition as possible from dental school

to his active duty assignment in the Navy or Marines."

CAPT Holliday has commanded the student company since its formation in January, 1956. Since then the CWRU Dental School has produced 102

officers through the early commissioning program, and eight more will be commissioned this year.

"We're very proud of the fact that about 20% of these graduates have chosen to make a career of the Navy," he said.

## NURSE CORPS SECTION

### WORKSHOP ON CONTROL OF HOSPITAL INFECTIONS

A great hazard to patient health in the world today is the increase of hospital acquired infection. The National Communicable Disease Center (CDC) of the United States Public Health Service functions as the specialized national public health resource dedicated to surveillance and to the prevention and control of infectious and other diseases of a preventable nature. Its mission is to provide services, including the dissemination of advanced knowledge and the teaching of improved techniques, that will enable the States to carry out effective programs of prevention and control within their boundaries.

The CDC Training Programs are being given on a continuous basis for all people involved in health problems. One such course was Surveillance, Prevention, and Control of Hospital-Associated Infections, Jan 29—Feb 2, 1968, Atlanta, Georgia. Nurse educators and administrators throughout the United States including Army, Navy and Air Force attended. LCDR Gladys Madsen NC, Education Coordinator from Naval Hospital, Oakland, California, attended the above course.

Working with CDR A. N. King MSC, (Officer in Charge of Preventive Medical School, Oakland) Miss Madsen presented a similar course for supervisors. This course consisted of two hours a day for five days.

*Objectives of this course were:*

1. To develop an awareness of the meaning of hospital acquired infection.
2. To show through laboratory procedures the presence of disease producing organisms in the hospital environment.
3. To develop an awareness of the need for Uniform Disease Centered Isolation Technique.

4. To develop an Orientation Education Program for all levels of personnel coming in contact with the infected patient.

5. To work with the Infections Control Committee in an effort to devise a program that will become a standard hospital policy.

As a result of this program, immediate steps were taken to change some existing practices and policies. Also, plans to conduct a continuing program on control of hospital infections are underway.

(Workshop on Control of Hospital Infections was conducted at NH, Oakland, California.)

### INHALATION THERAPY EQUIPMENT STUDY AT NH, OAKLAND, CALIFORNIA

The week of 5-9 February 1968, LCDR J. Silvestri, NC USNR and LCDR N. Swoboda, NC USN attended a workshop "Acute Respiratory Care", sponsored by the Cardiopulmonary Laboratories, Mount Zion Hospital and Medical Center, San Francisco, California.

The course dealt with the different aspects of the respiratory apparatus and its ability to maintain acid-base balance in the blood. Pathophysiology, blood gas determinations, and inhalation therapy were topics of instruction and discussion.

Respiratory failure occurs when the respiratory apparatus is unable to maintain acid-base balance in the blood. It is characterized by an increase in arterial  $p\text{CO}_2$  (hypercapnia) and a decrease in arterial PH (acidosis). The pathophysiology may involve abnormalities in ventilation, gas exchange, ventilation-perfusion relationship or a combination of these defects.

The only completely reliable method of assessing pulmonary function is by arterial blood gas deter-



minations. These values reflect the degree of acidosis or alkalosis. The  $p\text{ CO}_2$  of the blood determines the patient needs to be hypoventilated or hyperventilated. A discussion was held about the most satisfactory methods of meeting ventilatory needs, use of controlled ventilation by various respirators, and

prevention of the spread of infection via the respirators.

As a result of this training, the method of sterilization and use of the inhalation therapy equipment at this activity are being reviewed for the changes necessary to insure safe use of our equipment.

# PREVENTIVE MEDICINE SECTION

## ATROPINE—IT MAY SAVE YOUR LIFE!

The usual clinical dose of atropine for an adult is 0.5 mg. This dosage would be inadequate when given to patients suffering from anticholinesterase poisoning caused by organophosphorous type insecticides or the warfare "nerve gases."

The following case summary illustrates the heroic therapeutic measures, including large dose of atropine combined with the oxime 2-PAM-C1, utilized to save a life. As a result of exposure to the insecticide, Metasystox, a patient required 2.5 grams of the oxime 2-PAM-C1 and 24 mg of atropine in the first 24 hours. After the first 24 hours, the patient required 2 mg of atropine hourly with occasional injections of 2-PAM-C1. This dosage of atropine was continued until the eighth day when the dosage was reduced to 1.2 mg atropine hourly. Evidence of anticholinesterase poisoning returned and the dosage was increased to 2 mg hourly until the seventeenth day. On the nineteenth day, sublingual administration of atropine was substituted for parenteral injection. On the twenty-first day, atropine dosage was reduced to 0.4 mg hourly, but this again had to be increased to 2 mg hourly until the twenty-fourth day. During the next two days, sublingual atropine 0.4 mg was given hourly. Atropine was given at twelve-hour intervals until the thirty-first day.

The widespread use of toxic insecticides and the potential threat associated with chemical warfare makes it necessary for Medical Department personnel to be capable of diagnosing and treating individual or mass casualties resulting from anticholinesterase poisoning. First aid training provided to non-medical personnel of the Armed Forces must include instruction on initial management of these casualties.

The latest available information pertaining to diagnosis and management of chemical agent casu-

alties is presented in the recently revised publication, "Treatment of Chemical Agent Casualties, NAVMED P-5041," January 1968. This new manual provides detailed information on the use of atropine and 2-PAM-C1 in treatment of anticholinesterase poisoning.—NBC MedDefBr, PrevMedDiv, BuMed.

## MAN VERSUS ARTHROPODS

*Morb & Mort Rpt Dis, Part I, Dec 30, 1967  
and Part II, Jan 6, 1968.*

Direct contact of man with arthropods may result in a wide variety of reactions, most of which are limited to the skin. Arthropods which may cause skin disease include arachnids (spiders, ticks and mites) and insects (lice, flies, fleas, beetles, caterpillars, bees and wasps). Table I lists the differences between these classes.

Table I.—Differences Between Arachnids and Insects

Characteristics	Arachnids	Insects
Number of legs	Eight	Six
Thorax, head and abdomen	Fused	Separate
Wings	None	Present in most species
Antennae	None	Single pair

The mechanisms by which arthropods affect man and by which man reacts to contact with the arachnid or insect are: (1) toxic, the major damage is inflicted by poisons or venoms injected by the pest; (2) allergic, major damage is due to the reaction of the host to normally nontoxic substances, and (3) mixed, both toxic and allergic mechanisms are operative.

### Toxic Reactions

The brown recluse spider introduces a potent poison through its bite. The resulting skin reaction

is called "necrotic arachnidism." Systemic reactions also occur and are sometimes fatal.

This spider is of particular interest to inhabitants of the south central United States. It is found inside old houses, in cracks in walls, behind pictures or furniture and inside clothing. It does not attack unless molested. The local reaction to its bite is delayed for several hours and is manifested by local pain, ischemia and ecchymosis, followed by the formation of a bleb. Several days later, when the initial local reaction appears to have subsided, dry gangrene develops in the skin, with eschar formation and deep ulceration which may require extensive grafting.

The systemic reaction following the bite develops within a few hours and consists of fever, chills, malaise, nausea, vomiting and joint pains. A generalized measles-like rash as well as purpura may be present. The latter is due to thrombocytopenia which is accompanied by leukocytosis and sometimes by hemolytic anemia (hemoglobinemia, hemoglobinuria and jaundice). The systemic manifestations subside within one week. The best treatment currently available is the administration of antihistamines and large doses of corticosteroids. A specific antiserum has been devised for necrotic arachnidism following the bite of a South American spider closely related to the brown recluse spider.

#### Blister Beetle Dermatitis

Numerous varieties of blister beetles are found in the United States, primarily in the southeastern or western states. Agricultural workers are often exposed since the beetles feed on various flowering plants, potatoes, clover and soybeans.

Blister beetles are  $\frac{1}{2}$  to 1 inch long, soft, long-legged and very agile. In the United States they mature in the summer and disappear in the winter, which accounts for a strictly seasonal incidence. These insects contain the toxic agent cantharidin. Little or no cantharidin is excreted if the beetle is allowed to walk undisturbed across the skin but the slightest pressure on its body causes a clear amber fluid to exude from the knee joints, prothorax and genitalia. Mild tingling of the skin may develop in about 10 minutes, followed in eight to 12 hours by a soft blister without surrounding inflammation. A good-size blister may develop if the insect is crushed on the skin. Often the victim unknowingly brushes off the insect and is later surprised to find blisters which seem to have come from nowhere. Blister beetles are strongly attracted to light and contact

the skin mostly at night, so that patients discover the blisters in the morning. The blisters occur on exposed parts, frequently in a linear arrangement.

Treatment of the blisters consists of careful removal of the beetle without crushing, washing the area with solvents, such as acetone and benzene, and then cleansing with soap and water to remove the irritating material (cantharidin). Further local treatment is the same as for burns.

#### Allergic Reactions

The material injected into the skin by bite or sting may or may not be toxic. If it is toxic, the initial reaction causes temporary discomfort. However, because of the antigenicity of the material, repeated biting or stinging causes a severe reaction (anaphylactic shock) or a prolonged local reaction, such as papular urticaria.

#### Bee, Yellow Jacket and Wasp Stings

These insects are common throughout the United States. Local reaction following the sting is due to the release of toxic substances which cause inflammation, swelling and pain. This reaction can generally be controlled by the application of ice to the sting area and the use of oral antihistamines.

After single or repeated stinging, antibodies develop in the sensitized individual and a new sting will produce an allergic reaction which may vary from prolonged local inflammation to urticaria, angioneurotic edema, malaise, weakness, collapse and even death, from anaphylactic shock. When moderate these manifestations may be controlled by orally administered antihistamines and/or steroids. However, if the reaction is severe, the patient may require epinephrine (1:1000) intramuscularly as well as oxygen inhalation and plasma intravenously.

Patients known to be sensitive to wasp and bee stings should carry epinephrine whenever there is risk of exposure. Desensitization through repeated injections of small, graduated doses of prepared antigens must be considered for highly sensitive patients. This can be accomplished through a course of immunization with commercially prepared antigen from crushed insects (Hollister-Stier) or with the pure venom of the incriminated insect, followed by yearly revaccination (Loveless). Although the latter procedure is preferable, it requires highly specialized facilities for the collection of pure venom and is available only in a few large centers. Desensitization with commercial antigen, although somewhat less

satisfactory, gives a fair amount of protection and is available everywhere.

#### Papular Urticaria from Fleas, Bedbugs and Mosquitoes

There is more cellular inflammatory exudate in the lesions of papular urticaria than in simple hives. This exudate causes the lesions to persist for several days, weeks or even months, in contrast to the fleeting character of ordinary urticaria. Occasionally, classic urticaria and even angioedema may accompany urticaria of the papular variety.

The reaction seems to occur more often among children with a displaced background and, in certain types of skin, any insect bite may cause a prolonged local reaction similar to a very small area of lichen simplex (localized neurodermatitis). The insects most commonly responsible for papular urticaria are the following:

1. The flea. These insects are common throughout the United States. (A particular type is found on the West Coast, especially in San Francisco and San Diego.) After several months or years of exposure to flea bites, the papular urticaria type of allergic response eventually wanes and is replaced by a normal, transient reaction.

2. The bedbug. These insects are encountered primarily in areas of poor hygiene. Bedbugs remain on the clothing or bed linen from which they emerge to feed at night. They are active migrants and pass readily from one person to another. Since bedbugs can withstand long periods of starvation, even uninhabited areas may continue to be infested.

3. The mosquito. These insects are widespread in all areas in which there is stagnant water. Mosquito bites cause much discomfort because of the severe pruritus which accompanies the early reaction in certain individuals. This reaction may persist for weeks or months.

#### Control of Papular Urticaria Due to Insects

Several simple measures help eliminate insects which cause papular urticaria. A spray of 5% DDT should be used daily in the house. The baseboards, cellar, bed frames and upholstered furniture should receive special attention. A powder of 5% DDT should be dusted under cushions and rugs and wherever the spray cannot be used. All collections of sand around the house must be removed since they can harbor live flea eggs for as long as a year.

Contact with dogs and cats should be avoided if possible. Pet dogs should be dusted with 5% DDT powder once weekly for 3 weeks. Since cats may become sick from licking DDT, they should be dusted with pyrethrum flea powder. Sleeping quarters for pets should be provided with padding which can easily be removed, cleaned and aired.

Until the infestation is under control, insect repellent may be applied to the exposed skin of the patients.

#### Treatment of Papular Urticaria

The treatment of papular urticaria requires elimination of the cause as outlined previously. Topical measures include the use of antipruritic lotions and steroids, which decrease the itch and prevent the self-perpetuation of lesions. Oral antihistamines are sometimes helpful. However the treatment of choice is intralesional infiltration of triamcinolone acetonide or similar steroid. A small amount (0.1 to 0.3 cc) of 5 or 10 mg. per cc. suspension is infiltrated into each papule, deep in the dermis or in the subdermal tissue. Relief is obtained within a few hours and the lesions involute within 8 to 10 days.

#### Mixed Reactions— Caterpillar Dermatitis

Caterpillar dermatitis may occur anywhere in the United States. Epidemics of caterpillar dermatitis are occasionally seen in Texas during the migration of caterpillars. Several varieties can produce skin reactions, particularly the puss caterpillar; and the brown-tail moth. These caterpillars and moths possess venomous bristly hair or spines, which can pierce the skin on contact and cause nonallergic urticarial eruption. The lesions may persist for several days. Occasionally the dermatitis may simulate an allergic contact reaction such as poison ivy dermatitis.

Clothing and bedding which may have become contaminated with hair must be washed. The local reaction is best treated with cold, wet compresses and corticosteroid creams. In rare cases, widespread exposure may cause systemic reactions which require the administration of epinephrine and corticosteroids.

#### Chigger Bites

Chiggers are found throughout the United States but are definitely more prevalent in the South. The tiny red larvae of these mites bury themselves into



unprotected areas of the victim's skin and suck tissue fluids. Hunters, campers and farmers often complain of this type of bite. The reaction to the bite may be solely pruritic or it may be complicated by eczematous reactions, even after the larva has dropped off. In some instances, a persistent papule with an ulcerated center will develop.

Chigger bites can be prevented by wearing proper clothing and boots. Treatment consists of local anti-pruritic agents, corticosteroid creams and intraleisional corticosteroids as described in the treatment of urticaria. An ice cube pressed on the lesion often gives considerable relief. The application of clear nail lacquer is a popular remedy for relief of the itch from chigger bites. Rarely, persistent lesions may require cryotherapy, electrodesiccation or even surgical removal. Histologically as well as clinically, the papule or nodule may mimic the appearance of such neoplasms as lymphomas or sarcomas. For this reason, persistent reactions which may have followed insect bites must be evaluated with extreme care.

#### Protection Against Arthropods

Mass eradication of pests is an important public health problem. Every year, large sums of money are spent in government programs for this purpose as well as for the development of new control methods. These new approaches involve the use of substances which prevent reproduction and the release of sterile male insects to curb reproduction of species.

Protection of the individual is of greater interest to the physician. Considerable research is being devoted to substances which repel or block the attraction of insects to man. Some of these substances are present on the skin surface, probably in the lipid fraction. Also, certain sweat constituents appear to attract some insects. The possibility of developing repellents which are active when taken orally is also being investigated. This would represent a great advance in protection against arthropods.

The only practical agents at present are those which block the impulse to probe—the topical repellents. They are convenient, effective against several species of annoying arthropods and unlikely to have systemic effects. Some of the disadvantages of topical repellents are that they wear off quickly, they might not cover all exposed skin areas and they might irritate the skin. Other inconveniences are their odor, their oiliness and their softening effect on paint lacquer and synthetic fabrics.

At present, the best all-purpose repellent, particularly against mosquitoes, is DET (diethyltolu-

amide). It also repels ticks, chiggers, fleas and leeches. DET is contained in numerous commercial preparations, which are available either as sprays or as liquids. One recent preparation combines the repellent with a sunscreen agent.

Other effective repellents are dimethyl carbamate, dimethyl phthalate (good for mosquitoes and chiggers), ethohexadiol and benzyl benzoate. A good chigger repellent is 5% precipitated sulfur in a vanishing-cream base.

Impregnation of clothing is an effective method of protection against insect or chigger bites. This measure is used whenever there is heavy exposure and is especially suitable for forest rangers, hunters, fishermen and campers. The repellent should be applied to both the clothes and the skin. DET, diluted to 5% strength in water, may be sprayed or brushed on clothing. However, DET is removed by washing whereas benzyl benzoate will remain.

Because of the speed of air travel, some unlikely dermatologic eruptions due to insects appear in unexpected geographical locations. Recently, cases of "ver du cayer" (an equatorial African form of myiasis) have been reported in Manhattan and Wisconsin and a case of tugiasis (a tropical flea dermatitis) has been seen in New York City.

*NOTE:* BUMED recommendations for control of fleas on domestic pets (dogs and cats) include the use of commercial pet powders containing any of the following ingredients: Carbaryl (Sevin), malathion, pyrethrum, and rotenone. Use only in accordance with directions on the container.

#### PLAGUE IN THE REPUBLIC OF VIETNAM

*USDHEW PHS NCDC, Int Epidem Rpt,  
pp. 14-17, Jan 1968.*

Human plague has been present in Vietnam since 1898. Until 1963 only small numbers of cases were reported annually (1952-40; 1953-22; 1954-0; 1955-1; 1956-34; 1957-3; 1958-15; 1959-0; 1960-14; 1961-8; 1962-29; 1963-115; 1964-197; 1965-374; 1966-353). A far larger number of suspect cases were notified in 1966 than would be indicated by the 353 bacteriologically confirmed cases. There were provisional reports of 361 cases in 1965 (compared with 373 confirmed cases), but 2,665 provisional notifications in 1966 (compared with only 353 confirmed cases). In 1967, there were 5,247 provisional cases.

The geographic spread of the infection has increased considerably since 1962 when only 4 prov-

inces reported infections, and surveys showed most of the country free of rodent plague. In 1967, all provinces north of Saigon reported plague as well as a few in the Delta.

Several factors have contributed to the marked increase in human cases: (1) Probably a major epizootic of plague is currently in progress among both urban and sylvatic rodents; (2) increased military operations in Vietnam with the inevitable disruption of normal activities may have permitted large increases in the rodent population; and, (3) reporting may have improved with increased interest in the illness.

The infection has occurred principally in the bubonic form, but at least 2 outbreaks of pneumonic plague were recorded in 1965. One was a small, self-limited, familial outbreak in Long Khanh Province, with 5 deaths among 6 cases. The second outbreak in Binh Dinh Province caused 16 deaths among 43 persons infected.

The second outbreak of pneumonic plague was of particular interest because it led to the initial discovery of asymptomatic pharyngeal carriage by 3 healthy contacts. Subsequently, a study by Marshall, et. al., demonstrated that *Pasteurella pestis* could be recovered from the throats of patients with bubonic plague (16 of 212) and from their contacts (15 of 114). The organism disappeared spontaneously within 3 to 5 weeks; no infections are known to have resulted from these carriers.

Plague has been extremely rare among both United States civilians and military personnel located in the Republic of Vietnam, most of whom have received American vaccine. Only 6 cases are known to have occurred in the 2 groups. The diagnosis was supported by laboratory data in 4 of these infections. No information concerning the 2 unconfirmed cases is presently available.

*Case No. 1 (March 1963).* This 23-year-old white male was unimmunized against plague and had been located in Nha Trang, a site of recent plague case. He was seen initially on 21 March 1963 with a fever and a painful swelling in the left inguinal region. A diagnosis of lymphogranuloma venereum was made and the patient treated first with oral tetracycline and then penicillin. Three days later, the symptoms had become more severe with the development of headache, nuchal rigidity, and hypotension. A diagnosis of plague was suspected, and he was started on streptomycin and hydrocortisone. By the following day he was improved and after 3 weeks of hospitalization had completely recovered. Plague was

shown to be present in a guinea pig which had been injected with spinal fluid from the patient. The development of meningitis is thought to have been related to inadequate treatment initially while the disease was in a bubonic form.

*Case No. 2 (Jun 1966).* This civilian USAID worker traveled throughout the Republic of Vietnam as Chief of an Immunization Team. He had received 3 injections of killed plague vaccine in 1965 and 1 injection of living EV plague vaccine in Feb 1966. On 12 Jun 1966, he worked in the DaNang area where a plague outbreak was in progress. On 24 Jun, he became ill with fever, chest pain, a non-productive cough, and malaise. Following symptomatic therapy, he began to produce blood-tinged sputum and on 30 Jun 1966 a sputum specimen was obtained from which *Pasteurella pestis* was cultured. Following treatment with streptomycin and tetracycline, the patient made an uneventful recovery.

*Case No. 3 (Aug 1966).* This 21-year-old soldier had recently returned from Vietnam and was on leave in Texas when he noted a "knot" in his left groin. He was admitted to a Dallas hospital on 29 Aug 1966 with an initial diagnosis of incarcerated inguinal hernia. However, a lymph node biopsy revealed acute suppurative lymphadenitis. Subsequently, the diagnosis of plague was suspected and he was treated with streptomycin and tetracycline. This patient had a history of at least 2 immunizations against plague, 1 in Sep 1965 and the second in Jan 1966. His work in Vietnam involved tearing down rat-infested buildings and the men on this detail had at times engaged in contests of "stomping" the rats. The patient recalled at least one occasion holding a large rat by the tail. The diagnosis in this case was made on the basis of the epidemiologic and clinical history, supported by demonstrations of antigens of the plague bacillus in sections of lymph node stained with fluorescent antibody.

*Case No. 4 (Feb 1967).* A 19-year-old Army private who had worked on the wharf at Cam Ranh Army Area (South Beach), where plague was discovered in Nov 1966, was known to have had at least 1 plague immunization. He was hospitalized on 25 Feb 1967 with fever and left inguinal adenopathy. Subsequently, he developed pneumonitis, septicemia and hypotension, but improved within 72 hours while being treated with antibiotics. Plague bacilli were cultured from both the left inguinal bubo and from his sputum.

(The references may be seen in the original article.)

## KNOW YOUR WORLD

### Did You Know?

That Dr. Robert E. Switzer (RADM MC USNR) is issuing a "Life Saving Award" to individuals who have stopped smoking?

Dr. Switzer is presently Director of the Children's Hospital at the Menninger Foundation, Topeka, Kansas 66601. The certificate, printed on parchment, states that the person named, on the date stated, stopped smoking "out of regard for (his or her) own life and health." Individuals who desire this "Life Saving Award" can obtain one by writing to Dr. Switzer at the above address.<sup>1</sup>

That over 7,000 poisonings were recorded in Colorado in 1967?

The Rocky Mountain State's health department noted that many poisonings could have been avoided if all toxins were clearly labeled and kept out of reach of children.<sup>2</sup>

That the United States has just ended its first year free of human deaths from rabies originating within its borders?

One death each was reported in 1963, 1964, 1965, and 1966. The highest number of 9 deaths was in 1956. However, 2 persons contracted rabies in Africa: a 58-year-old woman bitten on 31 May 1967 by a stray dog in Guinea died on 25 July 1967 in New York, and a 9-year-old boy bitten in May by a dog in Cairo, Egypt, died 31 July 1967 in Portland, Oregon.<sup>3</sup>

That in 1965 and 1966, 535 tetanus cases were reported in the U.S.?

Tetanus morbidity and mortality has continued to decrease since 1950, although case fatality ratio has remained practically unchanged at about 65% during the last 17-year period.<sup>4</sup>

That in Cuba, rabies incidence decreased from 2,115 cases in 1959 to 321 cases in 1966?<sup>5</sup>

That zoonoses have increasingly become identified as occupational hazards?

The list includes Q fever in slaughter-houses and rendering-plant workers; jungle yellow fever and tick-borne diseases in woodcutters; salmonellosis in food processors; bovine tuberculosis in farmers; Newcastle's disease in poultry and processors; con-

tagious ecthyma in sheep shearers, and rabies in veterinaries, field naturalists and dog-control employees. Important addition is infectious hepatitis transmitted to man from chimpanzees and other sub-human primates; 80 instances have been established epidemiologically recently, involving mostly animal handlers and research biologists working with primate colonies.<sup>6</sup>

That 10,740 cases of viral hepatitis were reported in the United States or an attack rate of 5.4 cases per 100,000 population, from 1 Oct 1967 through 30 Dec 1967?

This represents an increase in rate of 15% over the summer quarter of the epidemiologic year 1967-68, and 15% increase over the fall quarter of 1966-67, and indicates a reversal of the downward trend in hepatitis since the peak year 1960-61 of the last epidemic cycle.<sup>7</sup>

That quarantinable diseases in 1967 for the Americas report: 11 cases of *jungle yellow fever* is the lowest recorded for 20 years?

One case occurred in Argentina, the first since 1948; 2 in Brazil; 4 cases in Colombia; 1 in Venezuela, and 3 in Peru.

*Plague* incidence declined since the major epidemic had occurred in 1965-1966 in the El Oro and Loja Provinces, Ecuador and Piura, Peru. There were 17 cases in Ecuador, 90 cases in Brazil, 3 cases in Bolivia, 3 cases in the United States (2 in Colorado; 1 in Arizona).

*Louse-borne typhus*: incidence was 137 cases in Bolivia, 167 Ecuador, 177 cases in Peru and 77 in Mexico.

*Smallpox*: reported 23 cases in Argentina; 4,250 cases in Brazil.<sup>8</sup>

That 5 mg pyrivinium pamoate base and piperazine 150 mgm in 1 ml of syrup or 25 mgm pyrivinium and 750 mgm piperazine in a lozenge were used in treating *Ascaris* and *Enterobius* infections?

Children under 11 years of age were given for 2 days 0.5 ml/kg/day. Children over 11 years were given 0.1 lozenge/kg/day for 2 days. Results were assessed by egg counts for *Ascaris* and Scotch tape examination for *Enterobium*. Forty-seven pts were treated, 41 followed up, 16 of 17 cured for *Enterobius*, and 25 of 29 cleared of *Ascaris*.



No effect was observed on *Trichuris*, *Strongyloides*, *Ancylostoma*, or *Hymenolepis*.<sup>9</sup>

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## EDITOR'S SECTION

### SYMPOSIUM ON COMBAT SURGERY

On Saturday March 23, 1968, 308 physicians and nurses from the Western States attended a Symposium on Combat Surgery held at the Naval Hospital at Camp Pendleton, California. Fourteen guest speakers summarized their experiences in specialties ranging from wound ballistics to thoracic surgery, urological surgery, anesthesiology, neurosurgery and surgical research. Each speaker has had personal experience in Vietnam and each speaker has recently returned from Vietnam.

The moderator for the meeting was the Professor and Chairman of the Department of Surgery at the University of California at San Diego Medical School, Dr. Marshall Orloff. Guest speaker for the occasion was the Commanding General of the Marine Corps Base at Camp Pendleton, Major General Lewis Fields USMC.

During the day there was a program of lady's activities during which the wives of the attending physicians toured the ranch house which serves as the commanding officers' home at Camp Pendleton.

The good turnout of physicians reflected the interest of military and civilian physicians in the medical progress achieved as the result of the Vietnam experience.

Host for the meeting was Captain H. G. Stoecklein, the commanding officer of the Naval Hospital at Camp Pendleton, California. In view of the success of this first meeting, plans for a second Symposium on Combat Surgery to be held in the spring of 1969 are already underway.—NH, Camp Pendleton, Calif.

### KINESCOPE RECORDING

Missile Wounds of the Brain—HA—PMB 729  
Naval Medical School Kinescope Recording—  
16mm black and white film  
Running time—28 min.

CDR Frederick J. Jackson, MC USN, Chief of Neurosurgery, Naval Hospital in USS Sanctuary

from November 1966 to October 1967 discusses management of neurosurgical casualties received as a result of the fighting around the DMZ in RVN.

Specifically, CDR Jackson discusses: the nature of the wounding missiles, the importance of thorough neurosurgical evaluation and triage, the unique problems of tangential cranial injuries, the use of angiography in postoperative management, the desirability of utilizing multiple surgical teams working simultaneously on one patient, new time-saving neurosurgical techniques, the use of freeze-dried dura, and treatment of retained intracranial bone fragments. The presentation is illustrated with radiographs and photographs.

This film is available on a loan basis from the Medical Film Library, NMS, NNMC, Bethesda, Maryland 20014.

### U.S. NAVAL HOSPITAL, YOKOSUKA RECEIVED 10,000TH PATIENT

With the admission April 15th of SGT Jose M. Rivera, USMC, the U.S. Naval Hospital, Yokosuka, Japan received the Hospital's 10,000th patient from Southeast Asia.

Marking the occasion for both SGT Rivera and the hospital was the presentation to the young Marine of a plaque bearing the hospital shield. The presentation was made by CAPT A. R. Errion, MC USN, Commanding Officer, U.S. Naval Hospital Yokosuka, Japan, COL H. P. Williamson, USMC, Commanding Officer Marine Barracks, Yokosuka, Japan and CDR A. T. Butler, NC USN, Chief, Nursing Service, U.S. Naval Hospital, Yokosuka, Japan. Following the presentation SGT Rivera enjoyed a steak dinner and shared a large cake with other patients on the ward.

Rivera is the son of Mr. and Mrs. Jose Rivera of Clarimont, Ohio.—U.S. Naval Hospital, Yokosuka, Japan.

## SEROLOGIC TESTS FOR PARASITIC DISEASES

The Naval Medical School, National Naval Medical Center, Bethesda, Md., occasionally receives requests from outlying hospitals and dispensaries for serologic tests for parasitic diseases. Serologic tests for parasitic diseases are not performed by the Naval Medical School. Such tests are available at other laboratories which are listed below. All requests for such tests should be accompanied by a short case history.

Sera for the following tests may be forwarded directly to these laboratories:

Laboratory	Test
Department of Serology Walter Reed Army Institute of Research Walter Reed Army Medical Center Washington, D.C. 20012	Schistosomiasis (SF1, CF) Clonorchiasis (CF) Paragonimiasis (CF) Trypanosomiasis (CF) Trichinosis (SF1, CF) Malaria (FAT) Amebiasis (HA)
Div of Veterinary Med Walter Reed Army Institute of Research Walter Reed Army Medical Center Washington, D.C. 20012	Toxoplasmosis (CF, HA)
Parasitology Unit Mycology and Parasitology Division National Communicable Disease Center Atlanta, Georgia 30333	Filariasis (FAT, SF1) Visceral Larval Migrans (CF) Cysticercosis (CF) Hydatid Disease (CF)
Code:	
SF1—Slide flocculation	
HA—Hemagglutination test	
CF—Complement fixation	
FAT—Fluorescent antibody technique	

## STAPH INFECTION MAY SOON FIND ITS CURE IN BEE VENOM

### Bacterial Contamination

About a year ago Navy scientists Shipman and Cole reported that the injection of bee venom into mice protects them against deadly X-rays. It was while conducting further studies to determine the component of bee venom responsible for this effect that they noticed that solutions of melittin remained free of bacterial growth when accidentally contaminated with bacteria.

To determine its range of activity and make sure that melittin was in fact antibacterial, the scientists conducted antibiotic plate tests on 30 different bacterial organisms, most of them isolated from animal sources.

Although a slightly higher inhibitory effect was achieved with the melittin fraction than with whole

bee venom, it was not large enough to be considered significant. For the 15 Gram positive microorganisms tested, growth was inhibited in 86% of them; whereas 46% of the 15 Gram negative bacteria tested were inhibited.

In an attempt to estimate the potency of bee venom and melittin, a comparison was made with penicillin. Among the Gram positive organisms tested, the antibacterial effect of one milligram of melittin was equivalent to that of as much as 93 units of penicillin; for a group of Gram negative organisms the equivalent penicillin level was as high as 1,700 units for one milligram of melittin.

The NRDL scientists are continuing their research on the antibacterial activity of melittin by performing in vivo tests with animals deliberately infected with *Staphylococcus aureus* strain 80. The scientists hope eventually to identify and characterize the chemical and metabolic basis of the antibacterial effect of this new source of antibiotics.—Office of Navy Information, Washington, D.C.

## DIRECT CURRENT VERSUS ALTERNATING CURRENT

Scientists of the Public Health Service's National Institutes of Health have found that direct current is superior to alternating current for halting effective heartbeat during open-heart operations.

In a recent issue of *Surgery*, Drs. Robert L. Reis, William S. Pierce, and Andrew G. Morrow, of the Surgery Branch, National Heart Institute, report that, unlike alternating current, direct current produces no harmful effects on the heart that might impede subsequent restoration of function when the operative procedure is completed.

In open-heart operations, the heart-lung machine routes blood around the heart and lungs so that it will not obscure the surgeon's view of essential anatomic detail. (The heart muscle itself is supplied with blood by perfusing the coronary arteries.) During some operations the heartbeat is also halted during the procedure, not only because it is difficult to work on tissues that are twisting and squirming with each heart-muscle contraction, but also because the surgical incision admits air into the heart. If this air is pumped into the circulation by a heart contraction, the result (air embolism) can be serious, even fatal.

A widely used technique to provide a quiet operative field and to prevent air embolism involves "juicing" the heart with a small alternating current to induce and maintain fibrillation. In fibrillation,

heart muscle cells continue to contract, but these contractions are no longer synchronized. As a result, fibrillation reduces normal heartbeat to an ineffectual writhing motion that pumps no blood.

Although the A.C. technique is effective, prolonged exposure of the heart to alternating current produces adverse effects that impede the recovery of normal function when heartbeat is restored upon completion of the operative procedure.

It causes constriction of the coronary blood vessels, increasing their resistance to perfusion and reducing the supply of oxygen to the heart muscle. However, the fibrillating heart actually expends more energy than the actively beating heart and so needs more oxygen. In the absence of sufficient oxygen to meet these increased needs, the heart increases energy production by a "back up" process called glycolysis. Through glycolysis, glucose can be converted to energy without oxygen; but the process is much less efficient than when glucose is metabolized with oxygen.

As a result of these effects, heart performance remains depressed for some time after termination of fibrillation.

In contrast, the scientists report, heart performance and metabolism are not adversely affected by prolonged fibrillation induced and maintained by square-wave DC stimulation. Coronary blood vessels are not constricted; in fact, their resistance to perfusion is reduced. As a result, the blood supply is adequate to support increased oxygen needs of the heart. Because heart metabolism is little disturbed by DC stimulation, heart performance quickly returns to normal with restoration of effective heartbeat.

As a result of these findings from animal studies, DC stimulation is now used in the National Heart Institute's Surgery Branch as a safe, dependable method of inducing and maintaining fibrillation in patients undergoing open-heart surgery.—National Institutes of Health, Bethesda, Maryland.

#### ASTHMATICS WARNED AGAINST OVERUSE OF AEROSOL DRUGS

A warning against overuse of aerosol-dispensed inhalant drugs for relief of asthma during acute attacks was issued by The Medical Letter, the fortnightly publication which evaluates drugs critically for 36,000 physicians and others in the health profession.

Although a cause and effect relationship has not been established, a number of sudden and unexpected deaths of asthma patients have been linked

to overuse of the bronchodilator aerosols, the pressure-packaged inhalant preparations for relief of asthma, The Medical Letter said.

The bronchodilators generally include one of two drugs, either isoproterenol or epinephrine. Some of the preparations can be obtained without prescription.

The Medical Letter cited the cases, reported in the British Medical Journal, of "four patients who were found dead with empty or near-empty bronchodilator aerosols in hand or nearby; eight other patients were admitted to hospitals during acute asthmatic attacks and died suddenly and unexpectedly. All of the patients had overused a bronchodilator aerosol before admission."

"In the past few years increased mortality rates for asthma have been reported in England and Wales, The Medical Letter said. In the United States, western Europe, Japan, Australia and New Zealand increased mortality rates have been observed in asthma patients from 10-19 years of age, the publication reported.

The British Medical Journal said on February 10, 1968 that "the increased use of these aerosols since their introduction in 1960 correlated closely with the increase in asthma mortality in Britain."

In one report published in the United States, nine of 17 asthmatic patients who had died during acute attacks were said to have been using one of the bronchodilator aerosols "excessively with decreasing benefit." In 12 non-fatal cases, patients developed severe wheezing while using six to 50 times the recommended dose of the aerosol drug.

The spray bronchodilators can usually control mild or moderate asthmatic attacks, The Medical Letter pointed out. Because of this, "asthmatics tend to become very dependent on them."

But the bronchodilator aerosols are especially hazardous when they are overused during severe attacks, the publication warns. So they should not be used by asthma patients whose attacks generally respond to oral drugs such as ephedrine.

Another factor to be considered is that when the "usual dose does not produce the usual relief," the asthmatic may try to use more of the drug and more often, and will risk a "rebound" effect in which his symptoms increase, rather than decrease.

Articles in The Medical Letter are based on a consensus of the publication's editorial and advisory boards as well as of a group of medical researchers, clinicians and teachers at hospitals, medical schools and research centers.



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